Chemical Week

October 12, 1957

Price 35 cents

Ultraenergy Fuels
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Big shale-oil find spells opportunity for industry. One hitch: land is Navy-owned . . . . . p. 44

Researcher's silent world points up management's new incentives to hire the handicapped . . p. 61

Chemical center on the way up: Memphis sees its CPI employment tripling in decade . . . . . p. 73

Building new pilot plants? Here's how Nopco carried off fourfold expansion on tight budget . p. 105

'Sad state' of copper industry is underscored by softening copper-chemicals prices . . . . . p. 137

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Photo courtesy of the New Jersey Rubber Company, Taunton, Mass.

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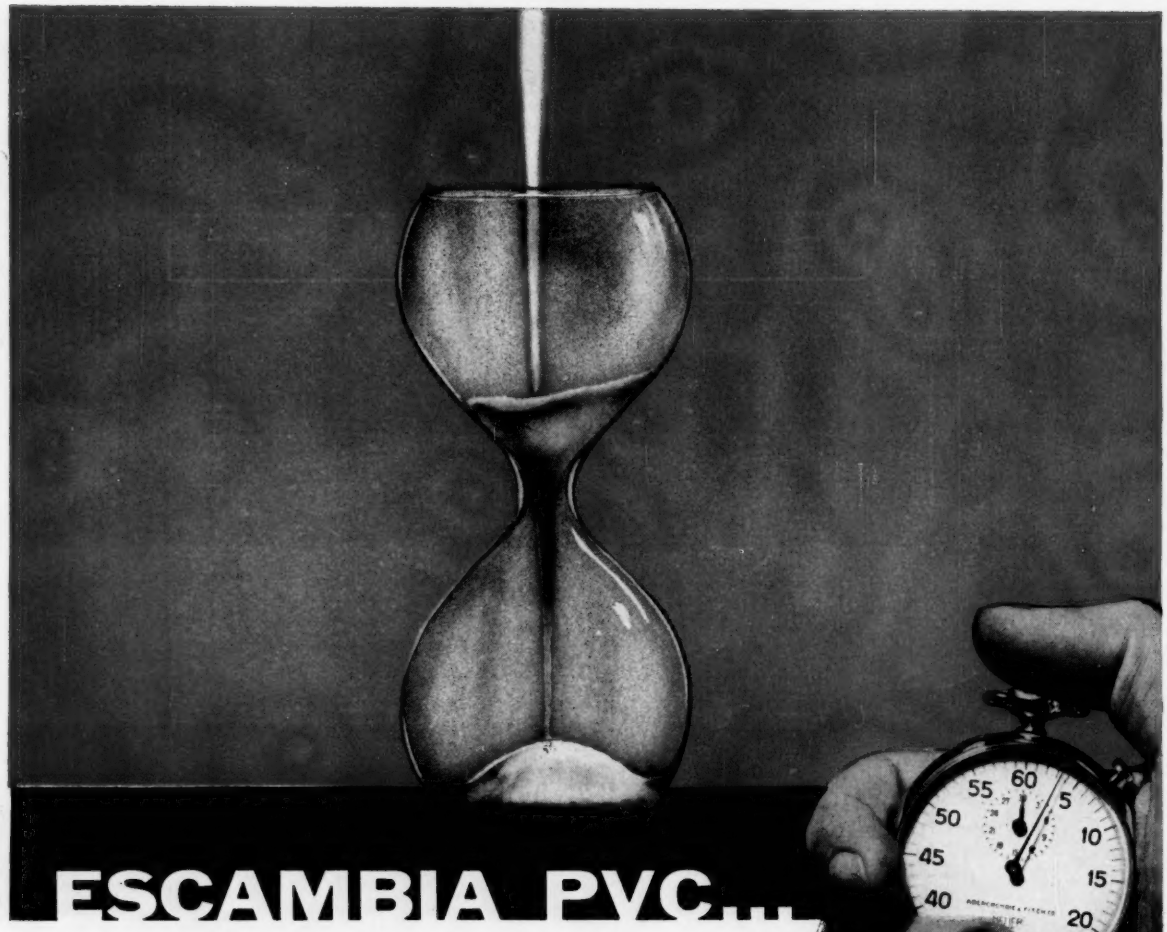

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Chemical Week

TOP OF THE WEEK

October 12, 1957

Is industry-wide bargaining a good thing for chemical makers? No, say AMA panelists ..... **p. 82**

Import-export houses will stress imports into U. S., as export trade gets more difficult ..... **p. 95**

Dry bleaches may be in for full-scale promotion, as new plants for raw materials go up ..... **p. 125**

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44 BUSINESS NEWS

Discovery of new shale-oil reserves spurs interest in Colorado's western plateau.

46 Mexico's new chemical trade organization will encourage U. S. chemical development south of the border.

47 Swiss government aims to sue U. S. in World Court over GAF ownership.

World atom agency starts first meeting as delegates seek new peaceful applications for atom.

A "public defender" for natural gas users may be appointed as result of latest rate increase request in Kanawha Valley.

Cabot Carbon is in a hassle over what gas company will supply its Tuscola complex.

Alcoa seeks franchise changes before it expands its North Carolina aluminum plant.

48 Chemical makers take Hoffa's election as Teamsters president in stride.

Chemical Workers union lists agenda for its Detroit convention next week.

51 WASHINGTON NEWSLETTER

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Physically handicapped researchers are finding it easier to get jobs.

61 Merck's Rita Walsh finds deafness no handicap at her job.

73 ADMINISTRATION

Tripling of chemical industry employment at Memphis within 10 years is manager's prediction.

80 Labor-management disputes grind on in the courts; here's the rundown on current cases.

82 Chemical employers tell views on company-wide bargaining: the answer is "No."

95 SALES

Export troubles forcing big chemical traders to switch to imports, may result in $40-60 million more.

100 Can "crash" product-familiarization training make nontechnical men into technical salesmen? Here's what Archer-Daniels-Midland learned.

105 ENGINEERING

Built-in savings helped Nopco quadruple its pilot-plant facilities on a $350,000 budget.

121 TECHNOLOGY NEWSLETTER

125 SPECIALTIES

Dry bleaches may at last be ready to seriously challenge the liquids.

130 For autos, rust-dipping replaces the spray gun at American Motors and Lincoln.

137 MARKETS

The copper industry is in a "sad state," and the situation is reflected in softening copper chemical prices.

145 MARKET NEWSLETTER

148 TECHNOLOGY

Ultraenergy fuels bid fair to exceed performance of boron-based high-energy fuels. Here's a rundown on who's doing what.

159 PRODUCTION

City inspectors, often viewed suspiciously by plant managers, are only trying to be helpful and reasonable, says Philadelphia's Department of Licenses & Inspections.

172 CHARTING BUSINESS

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No. 15

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Watch CW Grow — 37,807 copies of this issue printed

Behind the News

When you get to page 148 of this issue, you'll find a story on ultraenergy propellents. Although these systems are not, by any means, assured of commercial success, we think that after reading the story, you'll agree that the subject is of paramount interest to chemical management.

In this atomic era it has become clearly evident that the seemingly wildest "blue sky" theories can bear the seeds of a new technology. Frozen free radicals may seem far-fetched, but — who knows? — they may propel next century's space ships.

The story was initiated by our former West Coast editor, Elliot Schrier, now with Arthur D. Little's West Coast operations. Close to many firms involved in ultraenergy research, he became aware well over a year ago of the work and its ramifications for chemical processing. With the help of John Shinn, head of our Los Angeles News Bureau, he started piecing together the information. After many man-hours of interviews with Air Force and industry people, a comprehensive 20-page memo was produced.

Since that time, our New York and Washington staffs have been busy, adding to, checking, and updating the memo. A story of these proportions is, in the final analysis, a team effort.

A word of thanks is also due the many firms whose cooperation made this timely article possible.

Howard C. E. Johnson
Editor-in-Chief

New Index Available

The latest *CW* index—covering issues published in January through June of this year—is now available. But because of rising production and handling costs, it will cost 50¢ per copy.

They may be obtained from Reprint Department, Chemical Week, 330 West 42nd Street, New York 36, N.Y.

T F

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T.E.M.A. flanges and channels

Multiple outlet headers

Production forgings

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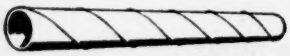
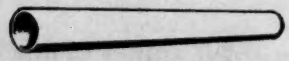
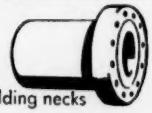


Spiral weld pipe



Large diameter electric weld pipe



Welding necks

For utmost value

FORGE Welding Fittings and Forged Flanges

Whether it's a "heavyweight", like the big special wall thickness WeldELL pictured here, or a Schedule 5S Stainless Steel "lightweight"—in fact *any* thickness, size or type of Welding Fitting or Forged Flange—you can be sure of utmost value if it's made by Taylor Forge.

In 57 years of specialized forging experience we've learned how to make metals do precisely what we want them to do . . . how to form them to exact dimensions . . . how to control grain flow so as to put extra strength where it is needed . . . how to maintain great accuracy and finest quality in everything we make from the smallest to the largest unit.

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What have these "warriors' shields" got to do with better product performance?

Among the hundreds of different types of par ticles found in Celite diatomaceous earth are thes "warriors' shields." Shown here magnified hundred of times, are, from left to right, *Navicula splendida Raphoneis amphiceros* and *Navicula lyra.*

They're particles of CELITE that adds strength-

Celite's unique diatomite structure is shown in this photomicrograph. The infinite variety of particle shapes and sizes gives Celite its exceptional performance characteristics in a wide range of process applications.

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Helps polish-cleaners soak up dirt. Celite's highly porous diatomite structure soaks up and retains dirt and grease . . . provides easier "wipe-off" of polish-cleaners. This same structure gives these products a mild, non-scratching abrasive action.

Adds strength to molded plastics. The harder grades of Celite impart high impact strength to many plastic products. Celite fillers also provide a more attractive surface finish and greater resistance to heat and moisture.

Controls gloss in paints. When included in paint formulations, irregular Celite particles protrude through the surface, diffusing light and providing a highly desirable flat appearance. Celite's high oil absorption also provides viscosity control for the finishes industry.

-the diatomite mineral filler soaks up dirt–controls gloss

THE structure of the individual diatom particle is the key to the success achieved by Celite* diatomite in so many process applications.

It requires 40 million whole or fragmentary particles to form a cubic inch of crude Celite. Consequently, even when added in small proportions, their properties are greatly magnified and widely dispersed throughout a formulation.

Relatively hard and irregularly shaped, particle contact is mainly limited to protruding outer points. Therefore, Celite won't pack down and has an extremely low apparent bulk density of 10 lb/cu ft. This explains Celite's high bulking action, excellent suspendability, and large particle surface area.

This same limited particle contact means that 93% of a given volume of Celite is composed of air pockets or voids. And, since the particles themselves are porous and cellular in structure, Celite can absorb more than twice its weight of liquid before reaching its limit.

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*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

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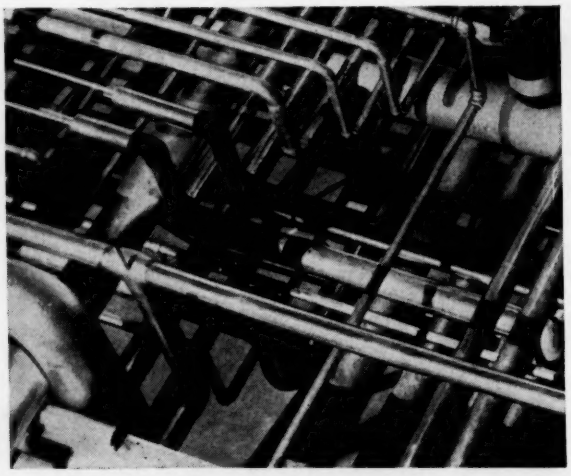
Aluminum makes construction faster and easier, thanks to its light weight and ease of fabrication. And it is non-sparking, amazingly strong, reflects heat.

For full information on how much Reynolds Aluminum can save for you, and how you can get Reynolds technical assistance, call the Reynolds office listed under "Aluminum" in your classified telephone directory. Or write direct *Reynolds Metals Company, P. O. Box 1800-CM, Louisville 1, Kentucky.*
International Division, 19 East 47th Street, New York 17, N. Y.



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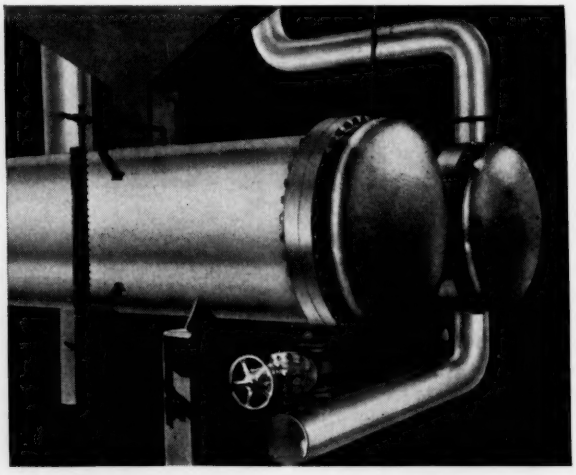

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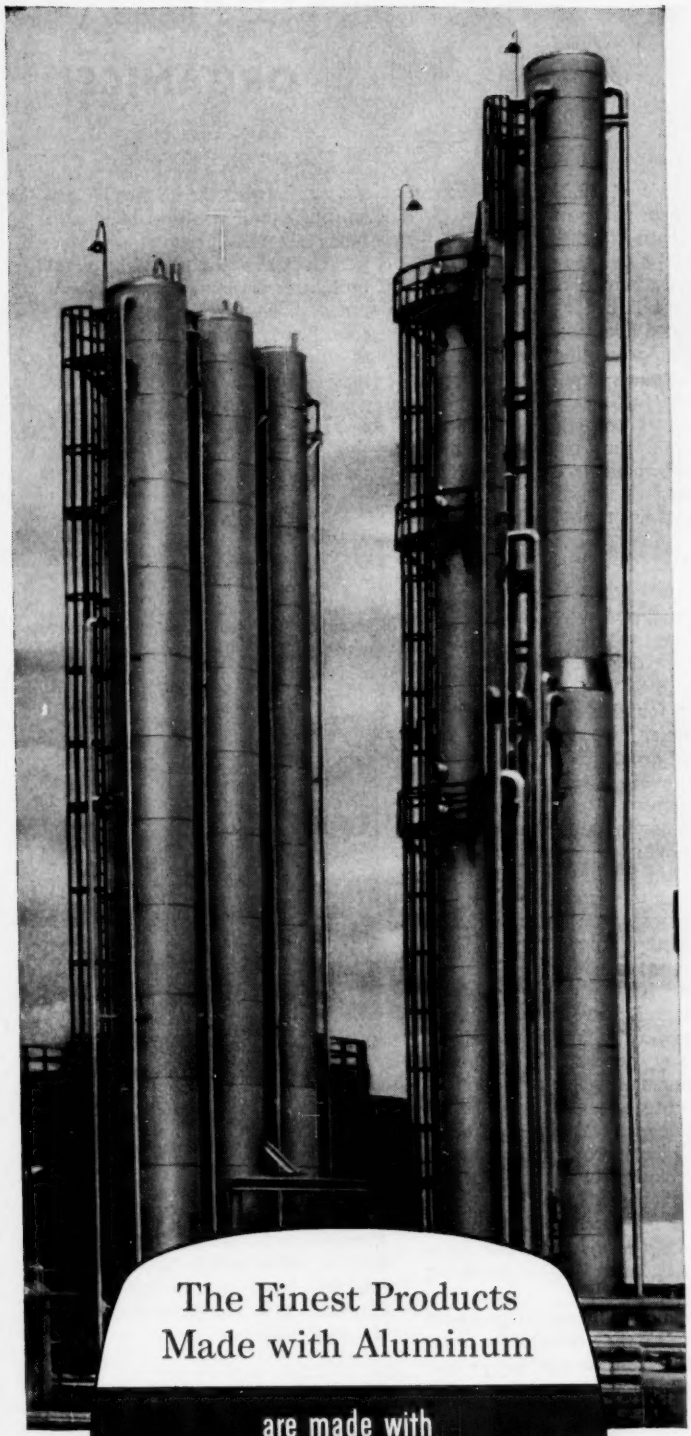

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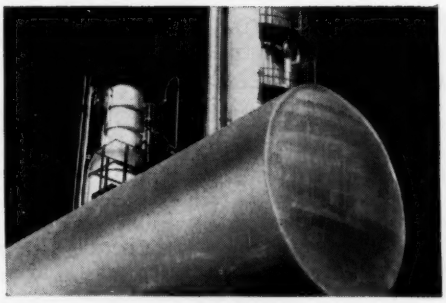

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It is as though a blindfolded man could distinguish between lemons, peaches, and apples but could not identify fruits as a class when they occur in a grab bag along with golf balls, dimes, and screwdrivers.

Difficult till now has been the chemical task of measuring the **carbonyl content** of a complex organic mixture, though, of course, methods for the identification of the individual aldehydes and ketones that bear the carbonyls are tucked away in the tool kits that young organic chemists bring home from college.

With sunny optimism, we proclaim quantitative carbonyl determinations to be now less difficult, wholly on the strength of a paper (*Anal. Chem., 28,* 1022) about non-aqueous oximation done in acetic acid with *Hydroxylammonium Acetate*. The paper has persuaded us to add this reagent to our list as Eastman 7376. The reaction goes

$$RR'C{=}O + H_2\overset{+}{N}OH \longrightarrow \underset{\displaystyle H}{\overset{\displaystyle |}{}}$$

$$RR'C{=}NOH + H_2O + H^+$$

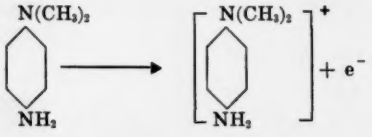
The proton neutralizes an acetate ion or equivalent. The process is observed and measured by potentiometric titration with perchloric acid. The presence of organic acid is immaterial (since everything is in acetic acid already). The abstract of the procedure is on the house.

• • •

During the past spring we noted a sharp upturn in the volume of our correspondence with psychiatrists. They all wanted to know whether we could supply the compound N,N-dimethyl-p-phenylenediamine dihydrochloride. In accordance with practice in the retailing game when you don't have exactly what the customer asks for, we replied to each that we would be happy to supply the monohydrochloride at $2.20 for 25 grams. This rejoinder got us nowhere.

Thus rebuffed (and deservedly so), we dipped a little into the fast-breaking literature of the borderland between chemistry and the ills of the spirit.

We learned about ceruloplasmin. It's an oxidation-promoting enzyme, a protein that accounts for most of the copper in the body. In *Science* for January 18, 1957 (*125,*117) appeared evidence that ceruloplasmin runs high in serum of schizophrenic patients, as adduced from an increased rate and depth of color development in the *in vitro* reaction



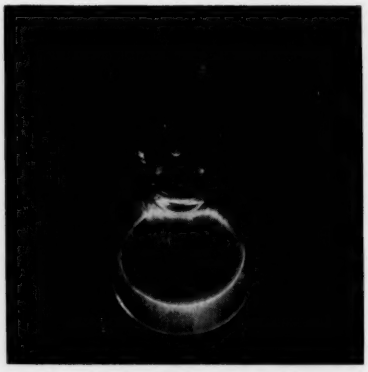
Here we found a region with landmarks familiar indeed to anyone who has thought deeply about photographic developers. p-Phenylenediamine is parent to a numerous family of aromatic amines that assume color when oxidized. Stability is enhanced by various substitutions and in the dry crystalline state by conversion to some salt or other.

If, in this case, the author chose to have two methyl groups on one of the amine nitrogens and, instead of one, two molecules of HCl to preserve his reagent on the shelf until ready for use, that was his privilege. So also is it the inalienable right of any neurophysiologist who wishes to pursue this line of laboratory investigation to be able to buy this dihydrochloride ready made without bothering to add the appropriate quantity of HCl to a solution of the base or the monohydrochloride. (The right may be exercised by purchase from us of *N,N-Dimethyl-p-phenylenediamine Dihydrochloride* (Eastman 7423) at $3.05 for 25 grams.)

And now, alongside one group of wise men who explain the tension of the times in terms of socio-economic forces and another group of wise men who watch the war between the id, the ego, and the superego, there stands huddled in stimulating talk a new group of wise men who point out that the tranquillizing chlorpromazine and Rauwolfia alkaloids are potent oxidase inhibitors. But even they seem largely to agree that anybody who at this time would depend solely on these enzymatic measurements for a positive diagnosis of schizophrenia is **crazy.**

• • •

If none of the 57 color-changing Eastman pH Indicators gives a color you can see through the material titrated, you might consider one of the 23 Eastman Fluorescent Indicators and an ultraviolet lamp. They change fluorescence with pH. They also lend a Mephistophelean air to your work.



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helps put research project on production line

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ON A HUNCH, P.A. PHONES MERCHANTS' sales office in Cincinnati, says he knows they don't distribute the chemical, but can they help out? His call sets Merchants' unique nationwide buying service in action, combing all possible sources.

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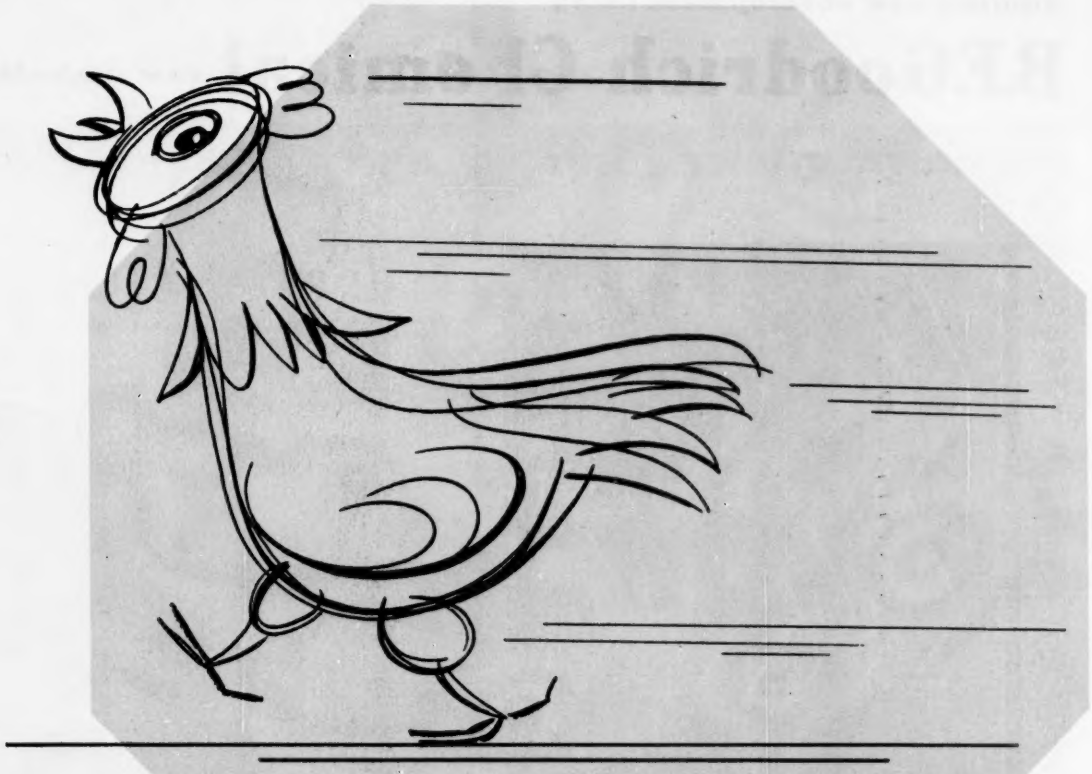

why does a chicken cross the road today?

When a chicken stomps off in a huff these days, more than likely he's just tried picking one of his neighbors and has had a distasteful surprise.

Poultrymen have tried all manner of remedies to curb cannibalism in their flocks, but nothing succeeded short of cutting off the chickens' beaks! But now, with the cooperation of a leading eastern university, Penick has developed an easy-to-use spray . . . THRAM* . . . that quickly ends picking!

THRAM is economical, easy to use and instantly effective. It makes chicken feathers so distasteful to other chickens that picking stops overnight.

THRAM is an outstanding example of Penick's versatility in manufacturing and marketing diverse chemical specialties. Our unique facilities and organization can be made available to you on a custom basis. We will be glad to discuss your needs in confidence.

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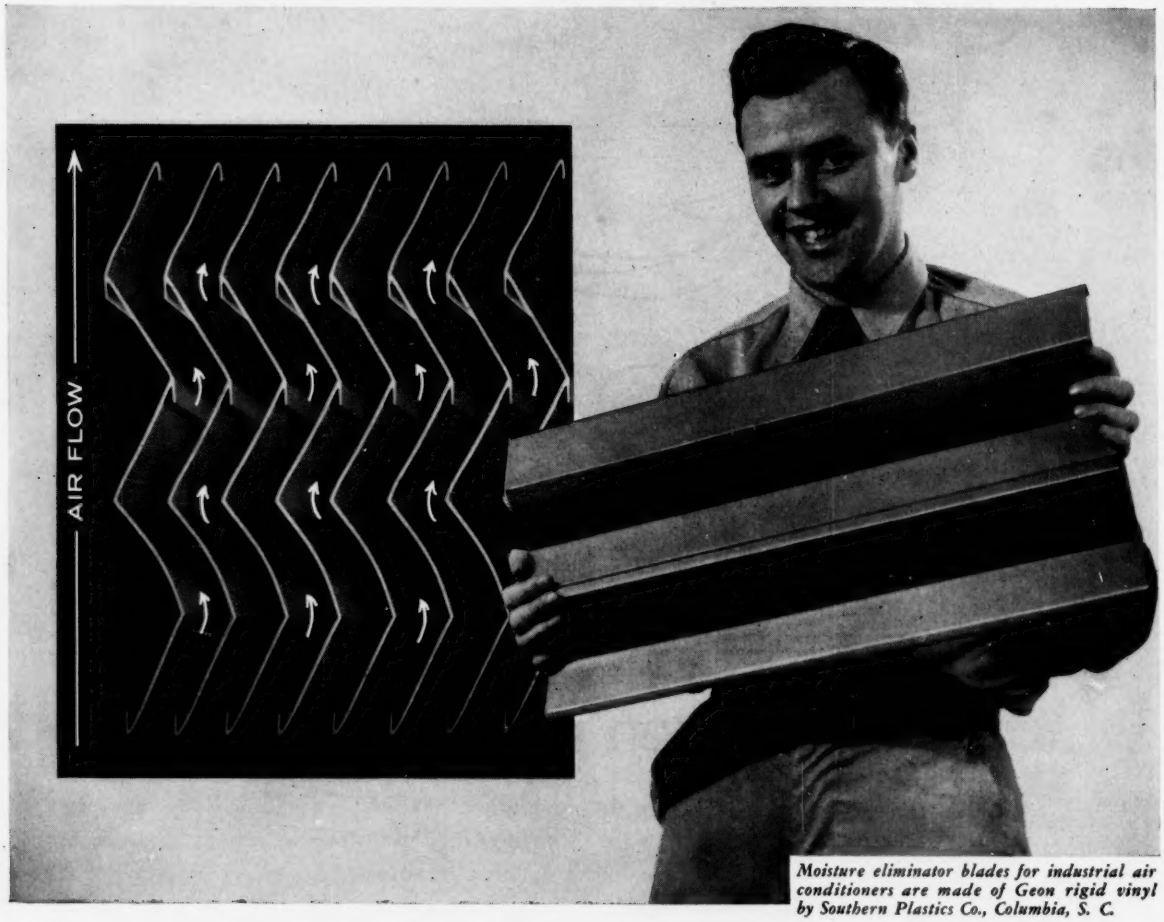
Another new development using

B.F.Goodrich Chemical *raw materials*



Moisture eliminator blades for industrial air conditioners are made of Geon rigid vinyl by Southern Plastics Co., Columbia, S. C.

blades of Geon keep air dry...end replacement problems

THESE moisture eliminator blades for industrial air conditioners are now made of Geon rigid polyvinyl chloride compound — to end frequent replacement of formed sheet metal blades.

Parts made of Geon rigid vinyl won't corrode. They are economical, easy to clean and extremely durable... meet flameproof requirements. Air-carried corrosive materials have no destructive effects on these blades because Geon has exceptional resistance to acids, alkalies and other chemicals.

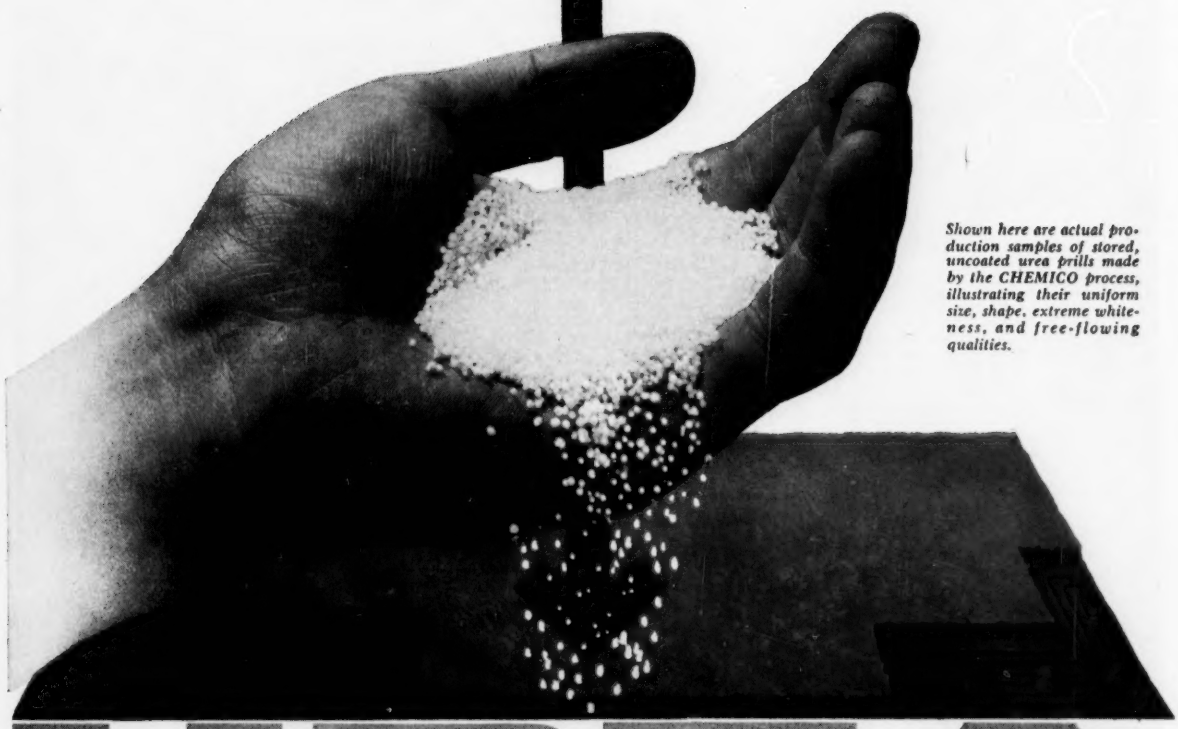
Geon polyvinyl resins and plastics are unique raw materials. Their outstanding physical, chemical and electrical properties have opened markets for many new products—rigid piping, wire insulation, flexible wall covering, foam padding, coatings for textiles, metal and paper.

For further information on Geon write Dept. FF-8 B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

LOOKING FOR A GROWTH SITUATION?



Shown here are actual production samples of stored, uncoated urea prills made by the CHEMICO process, illustrating their uniform size, shape, extreme whiteness, and free-flowing qualities.

UREA

Over 3500 tons per day . . . and still mushrooming! That's the story of urea, one of the fastest growing chemicals in the feed, fertilizer and raw plastics fields. With its high nitrogen content, urea gives more plant food value per ton with lower handling costs. In the plastics industry, urea-formaldehyde resins are used extensively as textile and paper treating agents, adhesives, and molding compounds.

With costs a decisive factor in the urea market, the exclusive CHEMICO process offers increased efficiency, higher yields and a product with a guaranteed 46% nitrogen content. CHEMICO also offers the only commercially available, American-developed process. Before you invest, get the details on the CHEMICO urea process.

CHEMICO

CHEMICAL CONSTRUCTION CORPORATION
A SUBSIDIARY OF ELECTRIC BOND AND SHARE COMPANY
525 West 43rd Street, New York 36, N.Y. • Cable Address: CHEMICONST, New York

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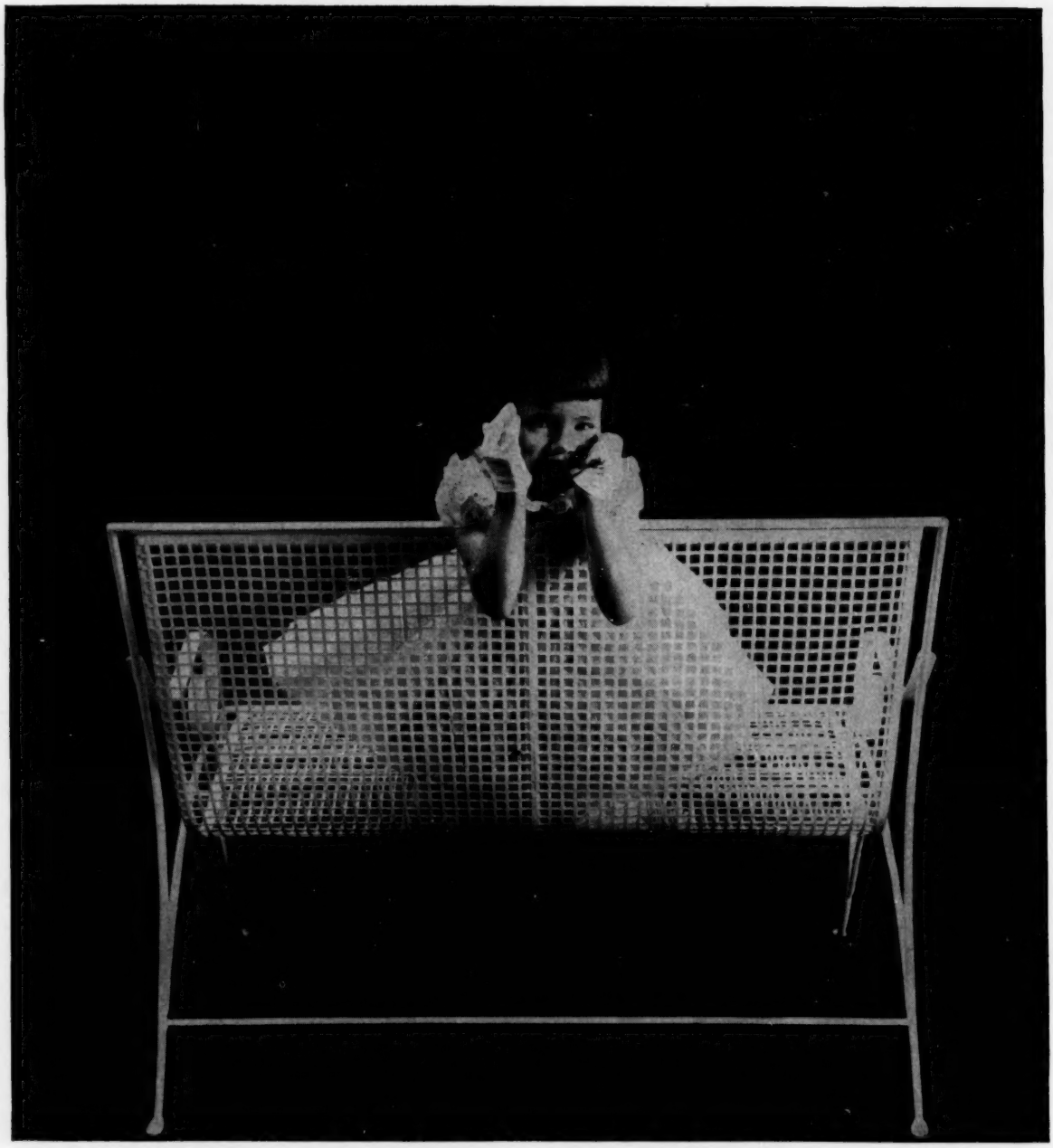

Confidentially, it's TITANOX*

An invitation to admire is extended by any painted surface whose white or tinted coatings are based on TITANOX titanium dioxide white pigments. And it's a long-standing invitation as well, for TITANOX-based paints have lasting power as well as luring power.

Whether your paint is for outdoor or indoor use . . . whether you're aiming for resistance to fading-chalking of industrial product finishes or tinted house paints or for "clean-up" of white house paints . . . you can develop the best formulation from the full line of TITANOX titanium pigments. In fact, TITANOX is the number one choice in titanium dioxide pigments for *anything* that needs white pigment—paper, rubber and plastics, paints or ceramics. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y. Offices in principal cities.

TITANIUM PIGMENT CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

*TITANOX is a registered trade mark for the full line of titanium pigments offered by Titanium Pigment Corporation. 5215-A

"Rumor has it he got a nice raise for discovering that Spencer service is wonderful"

Get fast delivery of Spencer Ammonia from: (1) Pittsburg, Ks.; (2) Henderson, Ky.; (3) Vicksburg, Miss.; or (4) Calumet City, Ill. (Aqua Ammonia only.)

NEED AMMONIA? . . .

Discover for yourself why so many of our customers say Spencer Ammonia service is wonderful. Whether you use Aqua Ammonia, Commercial Grade Ammonia or Refrigeration Grade Ammonia, write, wire or phone your order to Spencer Chemical Company. Spencer also produces Metals Grade Ammonia, the purest ammonia on the market today. Ask about it!

SPENCER

"Tanky"... The Symbol of Spencer Service

SPENCER CHEMICAL COMPANY

America's Growing Name in Chemicals

SPENCER PRODUCTS: "Poly-Eth" Polyethylene • Spencer Nylon • Ammonia (Commercial and Refrigeration Grade) • Aqua Ammonia • 83% Ammonium Nitrate Solution • Synthetic Methanol • Formaldehyde • Hexamine • "Mr. N" Ammonium Nitrate Fertilizer • SPENSOL (Spencer Nitrogen Solutions) • FREZALL (Spencer Dry Ice) • Cylinder Ammonia • Nitric Acid • Liquid CO_2

GENERAL OFFICES: Dwight Bldg., Kansas City 5, Missouri
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HYDROGENATION CATALYSTS

How Girdler helps you solve hydrogenation problems

• There are three important cost-cutting ingredients in Girdler catalyst service for hydrogenation applications:

1. Girdler's *proven hydrogenation catalysts*, such as listed, which are providing optimum operating economy in a wide variety of uses.

2. Girdler's accumulated *technical know-how* which is constantly finding new solutions to difficult hydrogenation problems.

3. Girdler's extensive catalyst *facilities* . . . manufacturing, research, development and technical service . . . which provide the ideal catalyst for *your* application.

Outline your catalyst problem and we will make specific recommendations. Bulletin GC 1256 describes the full line of Girdler catalysts . . . available on request.

NICKEL CATALYSTS	Leaders in the generation and purification of synthesis gases, and for a wide variety of organic hydrogenations. Girdler's close control of reduction and careful selection of support materials impart unique properties for difficult process problems.
COPPER CHROMITE CATALYSTS	One of most highly active and versatile commercial hydrogenation catalysts. Available in regular and barium-stabilized types either as powder or especially strong pellets. Powder meets certain specific particle density requirements.
SELECTIVE HYDROGENATION CATALYSTS	Widely used to selectively hydrogenate acetylenic and diolefinic compounds in purification of olefins. Custom made to give optimum performance with due regard for process variables and contaminants. Facilitate production of high purity olefins for petrochemical processes.
COBALT MOLYBDENUM CATALYSTS	Used extensively by many refineries. Highly active. Developed specifically for sulfur conversion and for hydrogen treating to remove sulfur and nitrogen . . . also for upgrading a wide range of petroleum feed stocks. Excellent physical properties assure high operating economy and long life.
NOBLE METAL CATALYSTS	Pelletized forms of platinum and palladium catalysts for special applications. Advanced techniques produce highly active catalysts, economical both in manufacture and use.

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The GIRDLER Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

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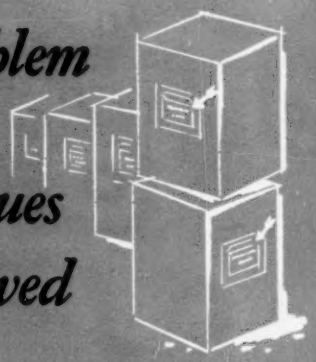
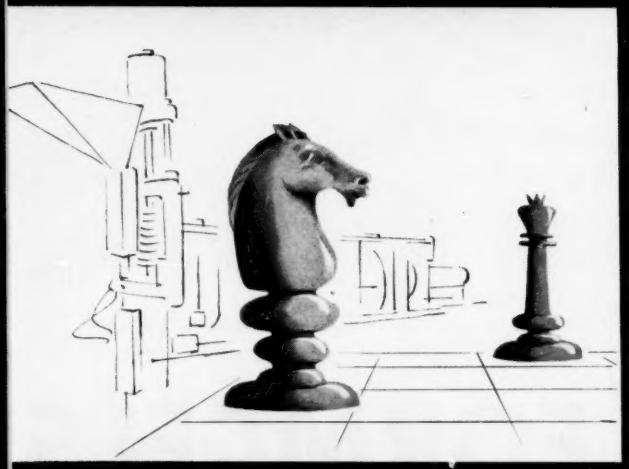
GIRDLER MANUFACTURES CATALYSTS FOR: HYDROGENATION • SYNTHESIS GASES AND HYDROGEN GENERATION • DESULFURIZATION • NEW CATALYTIC PROCESSES

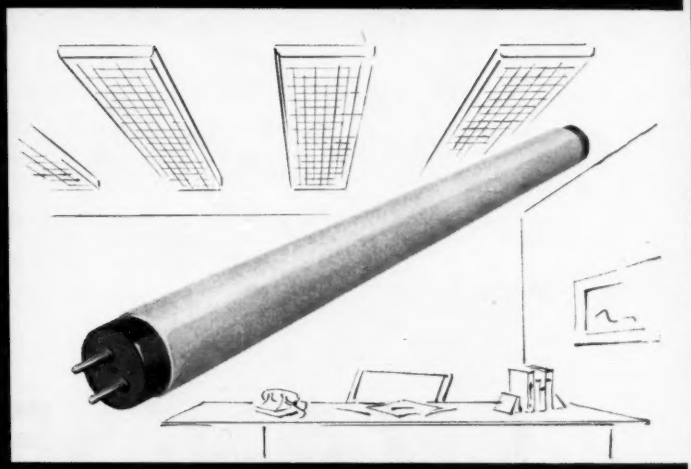
precise PHYSICAL FORM *is a problem*

that Mallinckrodt® *production techniques have often solved*



MALLINCKRODT PROCESS CHEMICALS MEET DIFFICULT SPECIFICATIONS FOR MANY INDUSTRIES





Stearates in Plastics

Mallinckrodt stearates have many uses in industry. *Zinc stearate* is used as an internal and external lubricant in plastics and also as a flatting agent in lacquers. *Magnesium stearate* is an efficient mold-releasing agent for plastic items. *Calcium stearate* is a lubricant and stabilizer in plastics and also improves the plasticity of starch-clay coated papers. Gelling characteristics of *aluminum stearates* are important in manufacturing greases . . . and in paints they increase pigment suspension without making the paints too thick for easy application.

Chemicals for Electronics

The ability of Mallinckrodt research and production chemists to control purity and maintain uniformity of *dibasic calcium phosphate* and other chemicals needed to manufacture phosphors has played an important part in the development of the fluorescent lamp industry. Mallinckrodt *Standard Luminescent chemicals* are also used extensively in producing television phosphors. Mallinckrodt *TransistAR® chemicals* are used in the manufacture of transistors and other semi-conductor devices.

Your particular application of these *and other Mallinckrodt industrial chemicals* may be different. Drop us a note on your requirements — *you might be better served by Mallinckrodt.*

Mallinckrodt **MALLINCKRODT CHEMICAL WORKS**

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the way you want it . . .

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CELANESE FORMCELS

(Formaldehyde in alcohols)

Celanese Formcels are low water content formaldehyde solutions in a variety of alcohols. They are developed to meet specific processing requirements and, by replacing formalin, can often provide economic as well as quality advantages. *The ratio of formaldehyde to water in Formcels is about ten times greater on a weight basis than 37% formalin.*

Formcels form a continuous phase with most organic compounds . . . react faster than formalin because the formaldehyde is in more intimate contact with the other reactants. Formcels do not require depolymerization, and, because they offer an alcohol medium in which all reactants are soluble, they contribute to faster reaction cycles.

Investigate Celanese Formcels: as organic chemical intermediates . . . for resin condensation reactions . . . for curing zein coatings . . . as an embalming fluid component. Mail coupon for Bulletin.

Celanese® Formcel®

Celanese Corporation of America, Chemical Division, Dept. 652-J, 180 Madison Avenue, New York 16, N. Y.

Send me Product Bulletin S-23-5.

I am interested in Celanese Formcels for _____ (type of application)

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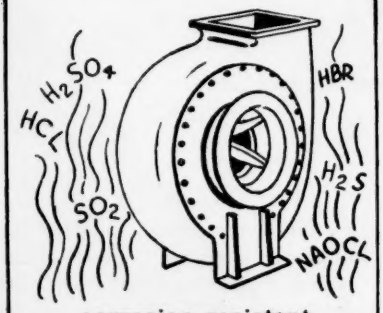
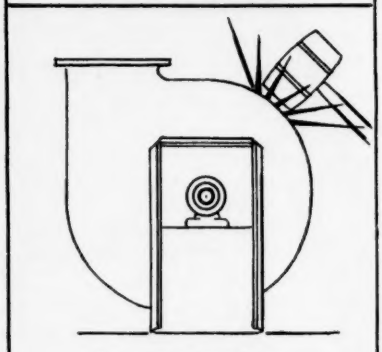
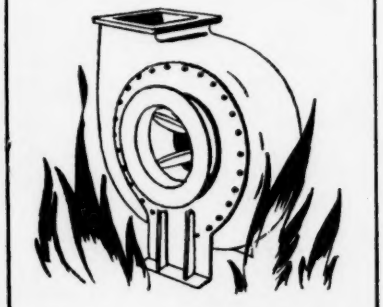
In Canada: Canadian Chemical Co., Limited, Montreal, Toronto and Vancouver.
Export Sales: Amcel Co., Inc. and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16, N. Y.



corrosion-resistant



impact-resistant



won't support combustion

"BUFFALO" RESIN-BONDED FIBER GLASS FUME FANS

These new fans further broaden the selection of "Buffalo" exhausters for the chemical industries, and offer advantages of versatility, lighter weight, reasonable cost and reliability.

The new Type "FG" offers excellent chemical resistance to a wide variety of acids, salts, gases, organic materials and other corrosives. It is suitable for temperature applications up to 225°F.

The fan housing is entirely of resin-bonded fiber glass, with stainless steel studs molded-in for attachment to the bearing stand. The rotor is a carefully balanced steel wheel with all exposed parts encased in thick fiber glass. In standard capacities up to 34,000 cfm at pressures to 10″ static. Write for Bulletin FI-511 for all details, including chemical resistance table and "Q" Factor* construction details.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

YTTRIUM

Availability of high purity yttrium and rare earth oxides

A report by LINDSAY

Only three years ago, most high purity rare earths were little more than laboratory curiosities.

Today they are extensively used for an amazing variety of chemical and industrial applications.

What happened? Lindsay technicians pioneered the first commercially installed ion exchange unit for the production of separated rare earths. The process was patterned after techniques developed by Doctors Spedding and Powell of the Institute for Atomic Research at Ames, Iowa.

Lindsay's pilot plant rare earth ion exchange installation had 40 six-inch columns. This unit made purified rare earths available to industry for the first time in practical, even though still limited, quantities.

The response from industry was so enthusiastic, we were forced to expand our ion exchange facilities rapidly. Today we have in continuous operation more than 100 columns with large production units of eighteen-inch and sixty-inch diameters.

With our larger production facilities, we are now making prompt shipments of high purity yttrium and rare earth oxides in quantities from a gram to hundreds of pounds.

TYPICAL MAXIMUM IMPURITIES IN LINDSAY PURIFIED RARE EARTH AND YTTRIUM OXIDES

ATOMIC NO.	OXIDE	CODE	PURITY	% RARE EARTH MAXIMUM IMPURITIES AS OXIDES
57	La_2O_3. LANTHANUM OXIDE	528 529	99.99 99.997	0.01 Pr, 0.001 Ce. 0.0025 Pr, 0.0005 others
58	CeO_2. CERIC OXIDE	215 216	99.8 99.9	0.2 (largely La + Pr + Nd). 0.1 (largely La + Pr + Nd).
59	Pr_6O_{11}. PRASEODYMIUM OXIDE	726 729.9	99 99.9	1 La + Nd + smaller amounts of Ce and Sm. 0.1 Ce + Nd.
60	Nd_2O_3. NEODYMIUM OXIDE	628 629 629.9	95 99 99.9	1-4 Pr, 1-4 Sm, 0.5-1 others. 0.1-0.4 Pr + 0.1-0.4 Sm + 0.5 others. 0.1 (largely Pr + Sm).
62	Sm_2O_3. SAMARIUM OXIDE	822 823	99 99.9	0.2-0.7 Gd, 0.2-0.6 Eu, and smaller amounts of others. 0.1 (largely Nd + Gd + Eu).
63	Eu_2O_3. EUROPIUM OXIDE	1012 1011	98-99 99.8	1-2 Sm + smaller amounts of Nd + Gd + others. 0.2 (largely Sm + Gd + Nd).
64	Gd_2O_3. GADOLINIUM OXIDE	928.9 929.9	99 99.9	1 Sm + Eu + trace Tb. 0.1 Sm + Eu + trace Tb.
65	Tb_4O_7. TERBIUM OXIDE	1803 1805	99 99.9	1 Gd + Dy + Y. 0.1 Gd + Dy + Y.
66	Dy_2O_3. DYSPROSIUM OXIDE	1703 1705	99 99.9	1 (largely Ho + Y + Tb + small amounts of others). 0.1 Ho + Y + traces of others.
67	Ho_2O_3. HOLMIUM OXIDE	1603 1605	99 99.9	1 (largely Er + Dy + small amounts of others). 0.1 Er + Dy + traces of others.
68	Er_2O_3. ERBIUM OXIDE	1303 1305	99 99.9	1 Ho + Dy + traces Yb and Y. 0.1 Ho + Tm.
69	Tm_2O_3. THULIUM OXIDE	1405 1403	99.9 99	0.1 Er + Yb + trace Lu. 1 Er + Yb + trace Lu
70	Yb_2O_3. YTTERBIUM OXIDE	1201 1202	99 99.9	1 Er + Tm + trace Lu. 0.1 Tm + trace Lu + Er.
71	Lu_2O_3. LUTETIUM OXIDE	1503 1505	99 99.9	1 Yb + Tm + traces of others. 0.1 Yb + Tm + traces of others.
39	Y_2O_3. YTTRIUM OXIDE	1112 1115 1116	99 99.9 99.9+	1 Dy + Gd + traces Tb and others. 0.1 Dy + Gd + traces Tb Approx. 0.05 Dy + Gd.

COSTS GREATLY REDUCED

Of course, as production of purified rare earths increased, costs came down. For example, only three years ago Terbium Oxide cost $500 a gram. Today you can obtain moderate size lots at less than $3 a gram.

Now that you know these high purity oxides are so readily available and the cost so remarkably low, what are *you* waiting for?

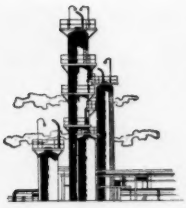
Rare earths, in purities up to 99.99%, have captured the interest and imagination of scientists in many industries as valuable new tools for the improvement of processes and products.

Your research, product development and production people should investigate the possibilities of these materials. Our bulletin "Purified Rare Earth and Yttrium Oxides" will give you detailed information and prices.

PLEASE ADDRESS INQUIRIES TO

LINDSAY CHEMICAL COMPANY

270 ANN STREET • WEST CHICAGO, ILLINOIS



How is your expansion program doing? Has it been delayed? Is it scheduled to begin soon? Regardless of the time factor, Parsons' Technical Planning Services* plus design†, procurement and construction are available to Industry and Government *with the future in mind.* By taking advantage of these services *now,* your facilities will be ready—when you want them—where you want them—the way you want them—to put you *one step ahead of the field.*

one step ahead!

**Technical Planning Services include Economic Studies and Appraisals, Geological Surveys, Raw Material Investigations, Site Selection, Master Planning, Research and Development, Pilot Plant Studies, and Criteria development.*

†Process, Mechanical, Electrical, Structural, Civil and other engineering services.

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means new ideas

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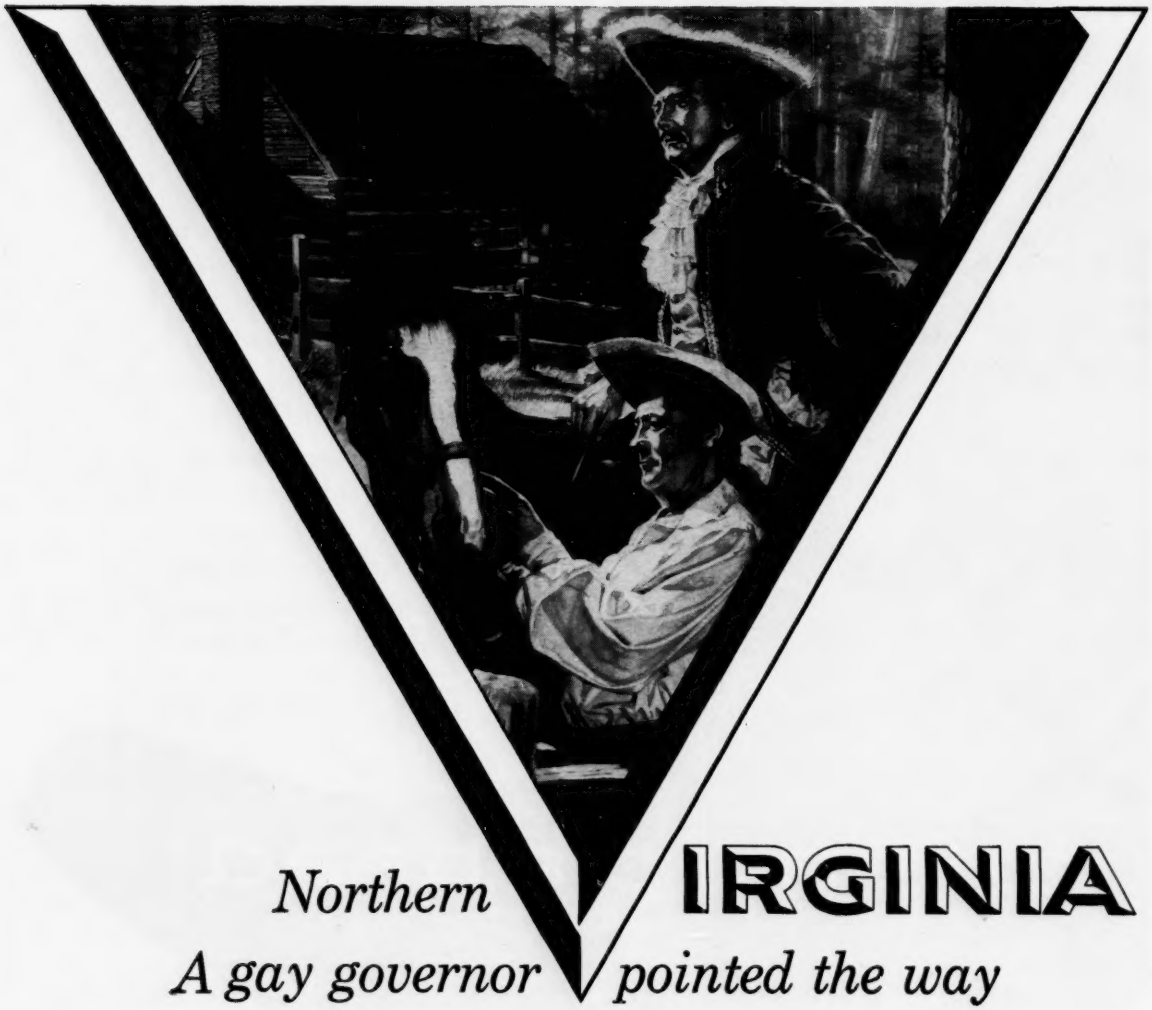
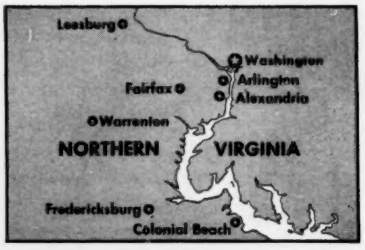


Northern VIRGINIA

A gay governor pointed the way for your new plant

"Among ye little Mountains" or rolling hills of Northern Virginia, Governor Alexander Spotswood founded Germanna, the state's first successful iron works, in 1714. And nearby, the gay Governor later built his "enchanted castle" with its mirrored drawing rooms, where tame deer ran about as pets!

Only ruins now mark the site of Germanna. But Spotswood's enterprising spirit lives on in fast growing industries that profit from Northern Virginia's big advantages. Advantages worth having if you plan a research laboratory, electronics plant or other light industry.



Young, educated workers—many with college or technical degrees—are plentiful here. You're close to the vast research facilities of the Nation's capital. Besides fine rail and highway transportation, you have Washington airport, and deep tidal rivers that bring ocean shipping 150 miles inland. And a mild climate cuts construction, production costs.

Plug in your plant to the low-cost electricity of VEPCO's power network . . . with a capability of 1,362,000 kilowatts, due to reach 2,000,000 kilowatts by 1959. And for confidential site-finding help . . . or full facts on this key area, write or phone VEPCO, serving "The Top of the South."

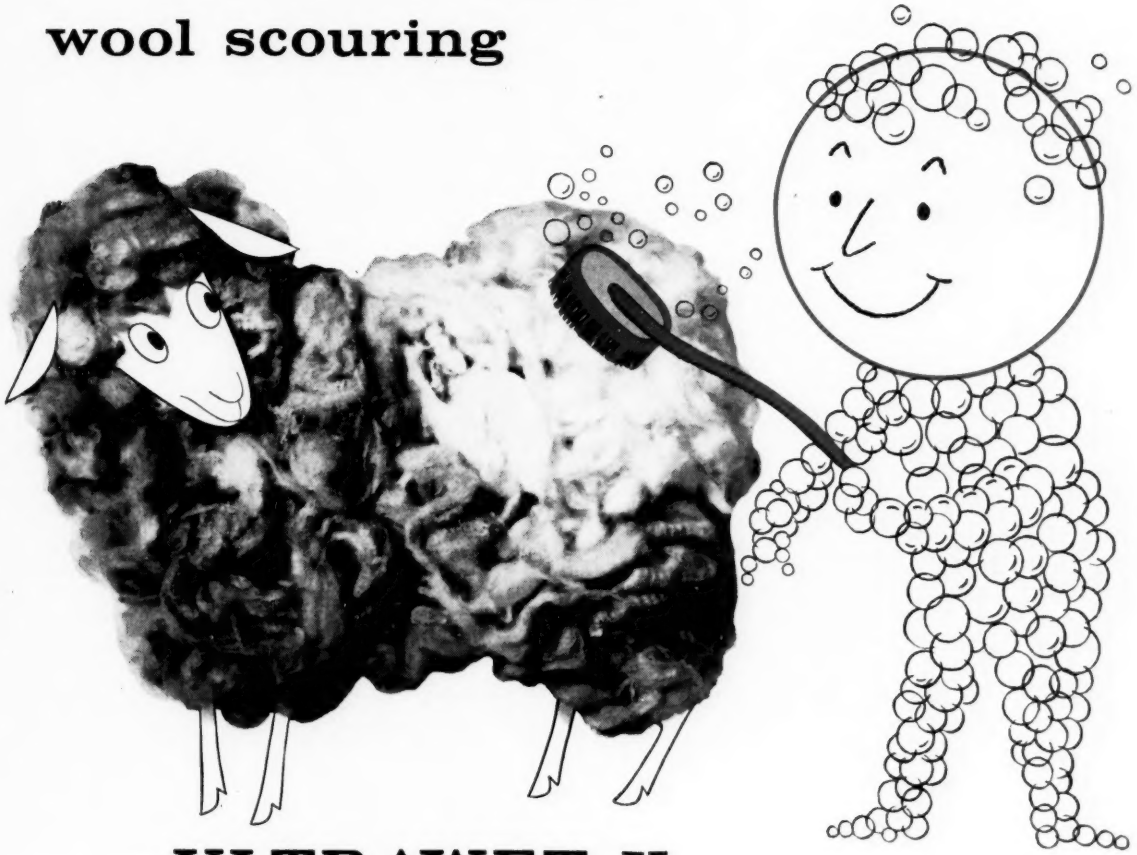
SEE SIGHTS AND SITES! Visit Jamestown Festival, up to Nov. 30, 1957 . . . and, see some of Virginia's plant sites, too!

VIRGINIA ELECTRIC and POWER COMPANY

Clark P. Spellman, Director—Area Development

Electric Building, Richmond 9, Virginia • Phone: 86-1411

Quality detergents for economical wool scouring



ULTRAWET K
ULTRAWET 35KX

ATLANTIC PETROLEUM CHEMICALS

PHILADELPHIA
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In Canada: Naugatuck Chemicals Division of Dominion Rubber Company, Ltd.

In Europe: Atlantic Chemicals SAB, Antwerp, Belgium

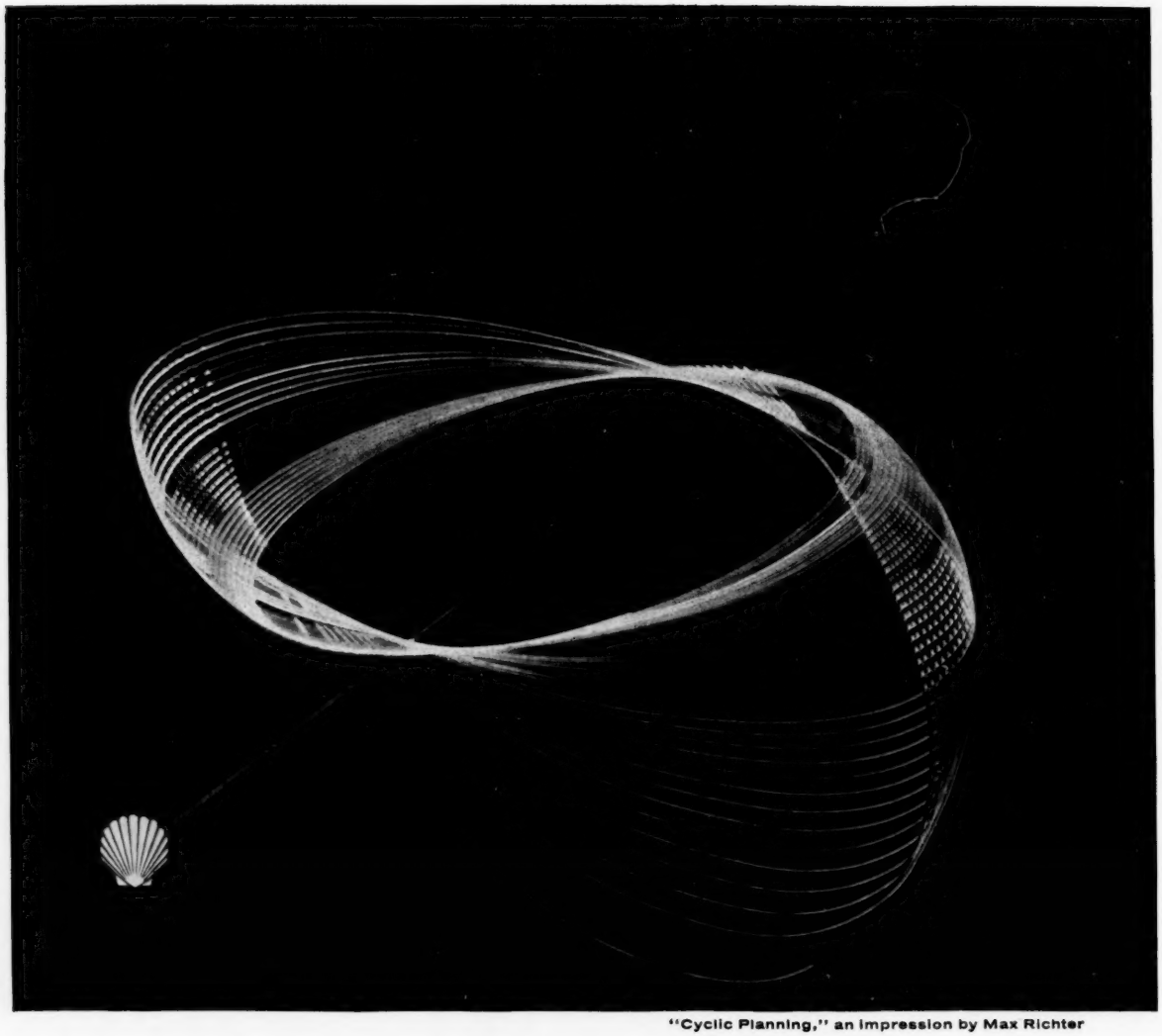
In South America: Atlantic Refining Company of Brazil, Rio de Janeiro

The ULTRAWETS wet, penetrate, clean, emulsify.

Change now to one of these ULTRAWETS for tough wool scouring and you'll see the quality results immediately. You'll also effect a *remarkable saving in cost.*

If you buy your scouring agent by the drum, choose ULTRAWET K—a water-soluble flake detergent. Or you can make greater savings with ULTRAWET 35 KX—a clear, light-yellow, odorless liquid. 35KX gives you the advantages of easier handling and the economy of tank car shipments. Both of these scouring agents are high-molecular weight alkyl aryl sulfonates characterized by exceptional detergency and wetting ability. They're effective in hard water or soft and give thorough emulsification of animal greases even when used in active concentrations as low as 0.2%.

Investigate the advantages of this modern method of wool scouring. For more information on Atlantic ULTRAWETS write, call or wire The Atlantic Refining Company, Dept. H-11. Philadelphia 1, Pennsylvania, or any of the offices listed.



"Cyclic Planning," an impression by Max Richter

BUYING SOLVENTS?

Costs go down with planned delivery cycles from a single source

When you make Shell your headquarters for solvents, you can keep costs down by planning your delivery cycles. For when you are buying less than tank car quantities of several different solvents, you can combine your orders to make up a full tank car and a single delivery can be made at bulk prices for all.

Compartmented tank cars and tank trucks permit multi-product deliveries promptly from conveniently located Shell stock points. And when you order solvents from Shell Chemical you can be sure that the products you receive will be uniformly high in quality, meeting or exceeding the highest purity standards set by industry.

Our technical service staff is prepared to assist you in the solution of product problems that may arise. Write for specifications and quotations on particular solvents.

- Acetone
- Methyl Ethyl Ketone
- Methyl Isobutyl Ketone
- Mesityl Oxide
- Ethyl Amyl Ketone
- Diacetone Alcohol
- Ethyl Alcohol
- Neosol® Solvent
- Isopropyl Alcohol
- Methyl Isobutyl Carbinol
- Hexylene Glycol
- Secondary Butyl Alcohol
- Isopropyl Ether

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SHELL

Business Newsletter

CHEMICAL WEEK
October 12, 1957

More polyethylene capacity, both high- and low-pressure, is imminent. Nearly simultaneously last week, Union Carbide and Du Pont said they are planning new units.

Carbide is planning a 72-million-lbs./year plant at Whiting, Ind., to make the high-pressure material. The new unit, according to the company, will bring its capacity to 375 million lbs./year. Carbide hopes to finish the plant by mid-'59.

Du Pont's low-pressure unit is still in the design-and-cost-analysis stage, would rise on a 600-acre site near Laplace, La. Du Pont has been pilot-planting low-pressure material at its Sabine River Works in Texas for about two years. The company has a Ziegler license, hasn't decided yet whether it will be used in the new plant.

•

Critical conditions in the Canadian textile business are cited as the reason for an upcoming government probe of the industry. Canada's tariff board will study textile tariffs in the light of contentions that employment of some 150,000 Canadians is seriously threatened by unfair competition from abroad.

Another Canadian probe—this one of fluorspar—is in prospect. The tariff board has been told by Finance Minister Donald Fleming to study tariff rates on fluorspar used in the production of heavy chemicals and other items. Sales, according to Canadian observers, have fallen off since U. S. stockpiling measures were discontinued.

•

A $1-million damage suit has been brought by Unity Oil Co. against Texas Gulf Sulphur. Unity has asked a Texas federal district court to make Texas Gulf pay damages and stop Frasch operations, which Unity says, have shifted underground formations in Beaumont and Jefferson counties and have forced shutdown of seven of Unity's oil and gas wells.

Damages totaling nearly $90,000 are sought by Tennessee farmers from Union Carbide and International Minerals & Chemical.

Six suits, filed in federal district court at Columbia, Tenn., charge that damages to crops, pastures, drinking water, lands and cattle allegedly stem from the defendants' negligence in allowing gases and chemicals from their plants to escape into the atmosphere. One of the suits seeks $50,000 from Union Carbide's National Carbon division; the remaining five seek a total of $38,998 from International Minerals & Chemical.

•

No settlement is in sight for an eight-day-old strike of 250 Imperial Oil Co. workers at the IOCO refinery at Vancouver, B. C. The

strike, authorized by Oil, Chemical & Atomic Workers International Union, Local 16-601, came as a climax to 15 months of negotiations.

C. L. Barber, union local president, said the union struck because the company rejected three contract changes recommended in a recent conciliation board award. The union says the issues, which the company claims have already been negotiated, involve benefits for men called out for night work, reclassification of certain personnel and supervision of two small employee groups. The company insists, however, that there are many major issues yet to be settled.

•

Today's titanium metals business is terrible, says Joseph Cain, president of P. R. Mallory & Co. Cain told financial men in San Francisco last week that Mallory "will be lucky to break even [in its titanium business] in 1958 and '59," but expects to see an improvement in '60.

The company is seeking to develop commercial outlets other than for military uses. Though it believes such markets are small, it thinks there are a lot of them. Cain expects Mallory's special metals business to earn $1.50/share in '60. Thus far, the company has invested $8.4 million in Mallory-Sharon Titanium, jointly owned with Sharon Steel Corp. and soon to be reorganized with Reactive Metals Inc. (*CW, Sept. 14, p. 24*).

•

Washington pulp mill operators were encouraged last week by a permit issued by Washington State Pollution Control Commission allowing the currently inoperative Shelton mill of Rayonier Inc. to dump waste waters into Puget Sound for the next five years. Though temporary—a permanent permit was turned down by the commission some weeks ago (*CW Business Newsletter, Sept. 21*)—operators hope it may set the tone for future dispensations.

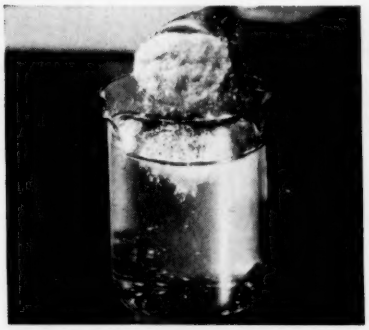
But opposition is already looming. Almost simultaneous with the permit came a report from the state fisheries director proposing that pulp mills barge their wastes to the Pacific Ocean. The report says there is "positive proof" that sulfite waste liquors are harmful to marine life. It says salmon fisheries are in a "desperate position" because of discharge of the waste into Puget Sound. Rayonier says, however, it can dispose of 97% of its waste by evaporation and burning.

•

Recent resignation of Diamond Alkali President John Sargent has evoked much comment from everyone except Diamond Alkali management. The company's position, however, will be made public soon in its quarterly statement to stockholders. Raymond Evans, chairman—and a major owner—of Diamond, who has now reassumed the firm's presidency, says that Sargent "could no longer satisfy his objectives in our organization and thus sought to realize them elsewhere in the business community."

BRIEFS for buyers of

Sodium Benzoate
Caustic Potash
Detergents, Germicides



Quick-dissolving sodium benzoate

Every now and then we run into someone who's having a tough time dissolving powdered sodium benzoate into process.

Like many fine powders, this form of sodium benzoate does occasionally give trouble by balling when it gets wet.

If this happens in your process, you can stop it for good—with Hooker *flake* sodium benzoate.

As you see here, this fine flake form starts dissolving in water almost instantly. In fact, you can completely dissolve one gram of the U.S.P. grade in only two ml of water—and still get a clear, colorless solution.

Thanks to an unusually careful flaking-screening operation, the Hooker flake stands shipping well—won't dust.

If you'd like to see how this quick-dissolving flake can speed your operations, order a trial drum now. *U.S.P. grade* is 99+% pure; contains a max. of 0.2% benzoic acid, 0.5% water. *Technical grade* is also high-quality material at 98%, with 0.4% benzoic acid max., and the remainder water.

You can get either grade in powder form, too. For complete technical data, check the coupon.

13 ways to buy caustic potash

If you're using caustic potash at all, you're probably using the "liquid regular" form, 45% to 52% strength.

Besides being easier to handle than solid forms, liquid KOH is generally cheaper to buy—except where freight charges on the water of solution exceed the differential in price.

However, for cases where you require a different form or grade, we offer you these 12 alternatives as well:

- Solid; flake; granular; broken; crushed; powder; walnut—all at 90% strength.
- Solid and flake, at 85% strength.
- Liquid, low-chloride—45%.
- Solid or flake, low-chloride—both 85%.

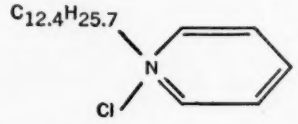
Some of these forms are tailored to meet the needs of a particular industry or even an individual customer.

Because of this specialization, you stand a better chance of getting just what you want when you specify NIALK® caustic potash.

For complete information on all forms and grades, check the coupon. Check also for bulletin describing physical properties, process of manufacture, uses, shipping and handling methods.

This detergent kills germs

You may be missing something big if you haven't looked lately at the properties of *lauryl pyridinium chloride.*



We produce this as a technical-grade mottled tan semi-solid, containing 85.0% min. alkyl pyridinium chloride calculated as C_{12}. It is greasy or soapy to the touch, and lathers freely in water.

Surface tension of a freshly prepared aqueous 0.01% solution at 25° C is 55 dynes/cm; of a 0.1% solution, 45 dynes/cm; of a 0.5% solution, 33 dynes/cm. The surface tension of dilute solutions becomes even lower during aging.

In aqueous solutions more dilute than .01N, the solute is molecularly dispersed. In stronger dispersions, the lauryl pyridinium cations are aggregated into colloidal micelles, but the solutions look clear to the naked eye.

Indications are that, like other quaternary ammonium compounds, lauryl pyridinium chloride has good germicidal properties. It is a potent bactericide against gram-positive and gram-negative microorganisms.

Where can you use it? At present, a major use is in wetting and lubricating the tiny spinnerette holes through which viscose squeezes just before it becomes rayon.

Some other places where you might put it to work, if your field of interest is:

Textiles—for cleaning fibers; in water-soluble lubricants; as wetting agents, color modifiers.

Pharmaceuticals—as industrial germicides; in disinfectants, preservatives; antiseptic soaps.

Agriculture—in insecticides, fungicides, horticultural sprays.

Elsewhere—intermediate for foam-resistant compounds; general cationic emulsifying, dispersing and wetting agent; photosensitivity modifying agent; leveling agent in polishes and waxes; lubricant for preparation of hydrophobic surfaces to promote dropwise condensation.

As an exploratory starting point, why not check the coupon for a data sheet on this product? *If you'd like an evaluation sample, please write us on your business letterhead.*

For more information on chemicals mentioned on this page, check here:

- ☐ Sodium Benzoate, U.S.P. and Tech.
- ☐ Caustic Potash (descriptive bulletin)
- ☐ Caustic Potash (data sheet)
- ☐ Lauryl Pyridinium Chloride
- ☐ New list of products—Bulletin 100-A

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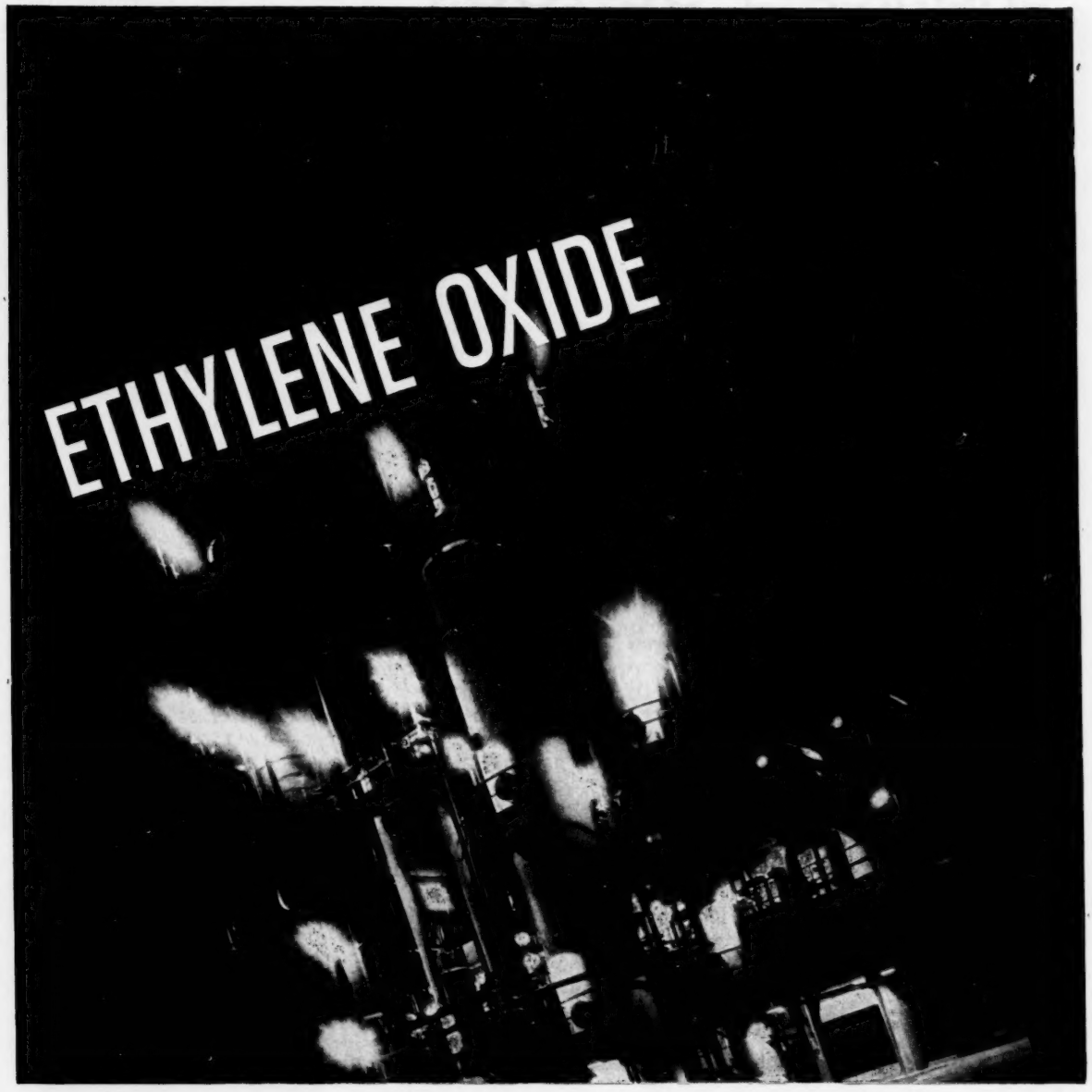

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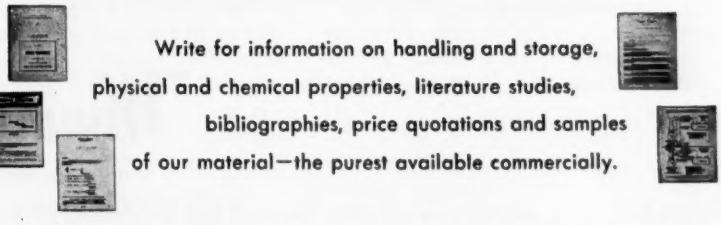

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CHEMICALS OUTLOOK

October, 1957

This news bulletin about Wyandotte Chemicals services, products, and their applications, is published to help keep you posted. Perhaps you will want to route these and subsequent facts to interested members of your organization. Additional information and trial quantities of Wyandotte products are available upon request . . . may we serve you?

CONTINUOUS UNIT OFFERS SAVINGS FOR BLEACH MANUFACTURERS

Many paper, chemical, and bleach manufacturers who are now preparing sodium hypochlorite bleach by the batch method can effect sizable savings by installing a continuous unit. The continuous unit requires a larger investment in equipment than the batch method, but it reduces labor costs and requires less space. And the continuous method offers better control . . . produces a more uniform product.

In order to help bleach makers make this decision, we have installed a continuous unit in our pilot plant at Wyandotte, Michigan. Potential users are cordially invited to visit Wyandotte and inspect these facilities. They are a valuable aid in providing answers to varied bleach problems all the way from process design to optimum properties of the finished product.

Our unit utilizes oxidation–reduction potential as a means of controlling the preparation of hypochlorite bleach solutions. This system is inherently flexible . . . with only a few minor modifications it can produce sodium hypochlorite solutions containing from 40 to 160 grams per liter of available chlorine. Either liquid or gaseous chlorine can be used, but control is better with gaseous chlorine.

The economics of installing a continuous unit depend, of course, on your own plant conditions. Wyandotte technical service is available to help you review your facilities and circumstances for sodium hypochlorite production, and recommend a course of action based on the economics involved.

If the batch method proves best for you, our extensive experience in this area may prove helpful. If the use of a continuous unit is indicated, Wyandotte technical service is equipped to give complete information on how to design and build a system, including specifications, an estimate of potential savings, and advice on operation.

To arrange a visit to our pilot plant, or for further information, write us on your company letterhead. Please include as much data about your operation and requirements as possible. Address all inquiries to Department CO for prompt attention.

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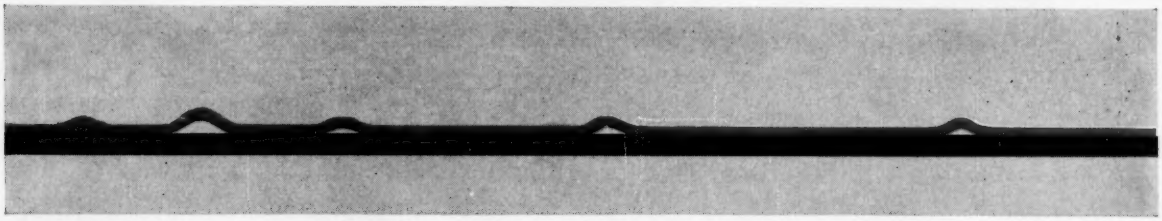
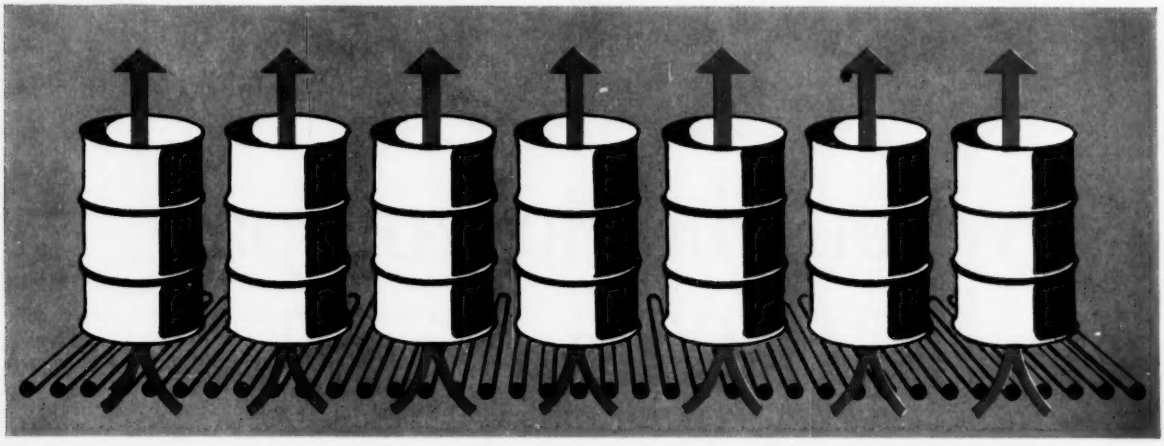
Now! No trace of blisters or pinholes!

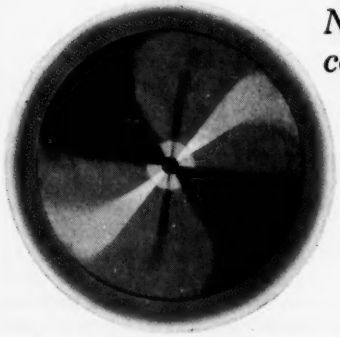


Globules of air or solvents can be trapped in lining material applied to steel drums by the air spray method These expand under heat during the curing process.

Eventually, these blisters in the partially cured lining material break through, causing pinholes. This cannot happen with lining materials applied by the Rheem Centrifugal Spray Process as no air is used, and solvent content is vastly reduced.



And Rheem uniformly applied linings are properly cured by high temperature baking which insures even, free flow of warm air vertically through every drum.



New Centrifugal Sprayer spins off a continuous curtain of finely atomized lining material at a controlled, uniform rate.

New Rheem Centrifugal Spray Process gives you a completely uniform lining, drum after drum after drum!

All surface areas of a drum automatically lined by the new Rheem Centrifugal Spray Process are—*and stay*—completely and uniformly coated.

This new, fully automatic process not only eliminates globs and skips, but blisters and pinholes as well. And Centrifugal Spraying, teamed with the new Rheem Vertical Baking Process, results in a curing job never before equaled!

Only the new Rheem Centrifugal Spray Process gives you: (1) Uniform lining thickness—controlled to within .1 of a mil. (2) Uniform viscosity of lining materials with lower solvent content. (3) Uniform application. There's no air turbulence because there's no air used in the spray and no drum rotation. Spray always travels the same distance to coat all surfaces. Human element eliminated. (4) Uniform curing—thanks to vertical, 3-stage ovens with controlled air flow and temperatures.

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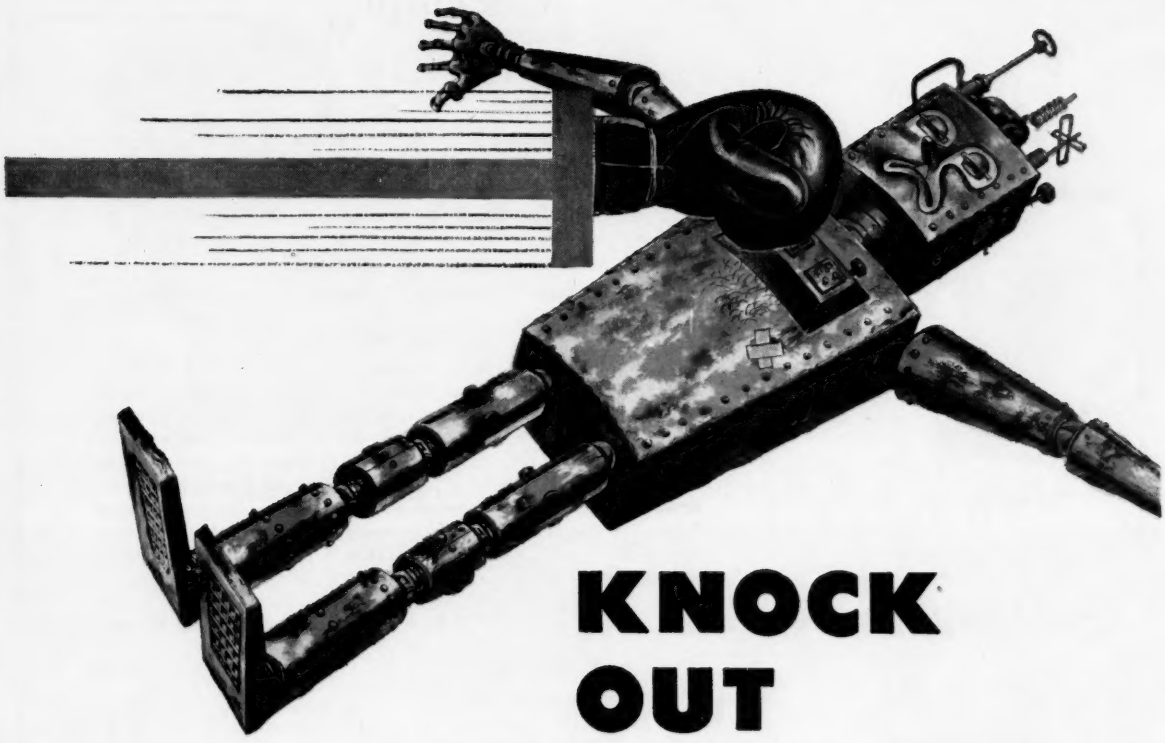

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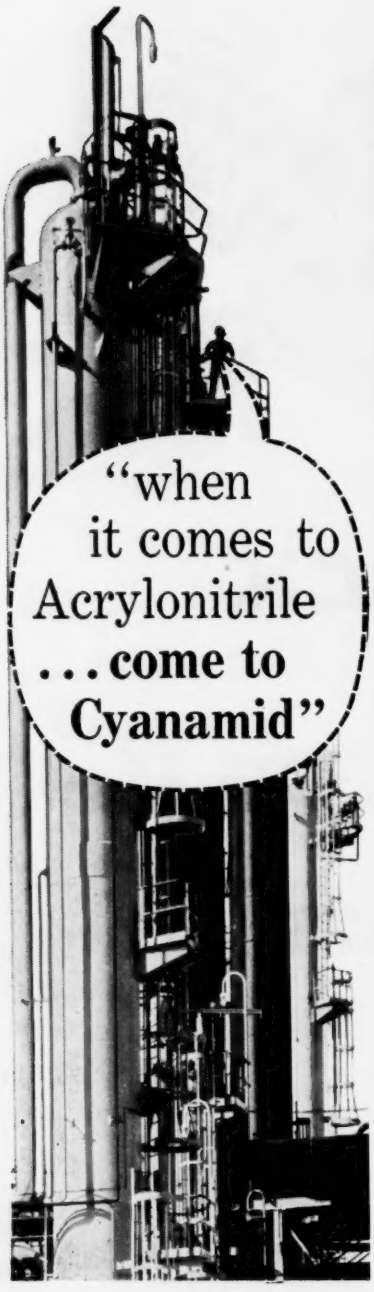

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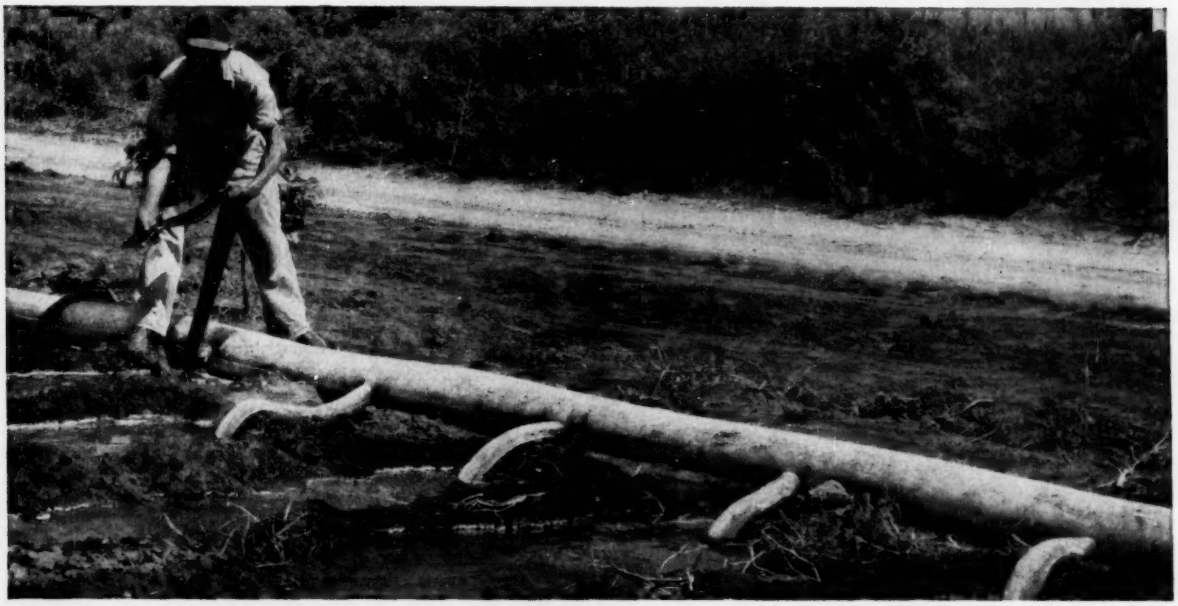

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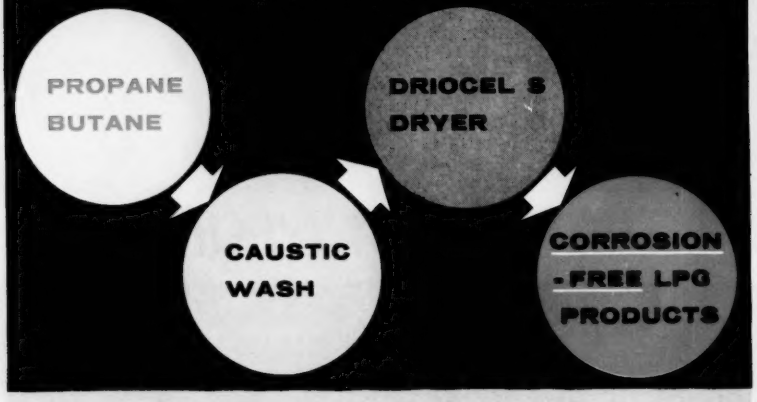
case: How Driocel S® dries LPG products corrosion-free



Desiccant Report: Driocel S is a low-cost, long-service-life drying agent. M & C developed it to overcome corrosion of LPG products in the final drying step. It works three ways:

1. *Does a thorough job of drying.*
2. *Does not* exhibit a corrosive reaction with sulfur compounds which escape caustic wash, are in the pre-dryer stream (which may even test "pass"), and then are decomposed in the dryer by ordinary desiccants to yield corrosive products.
3. *Does not* polymerize unsaturates under normal drying conditions.

Specific properties of Driocel S also suggest its use in the drying of chlorinated and fluorinated hydrocarbons.

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ACTIVATED BAUXITE (*Porocel*)
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LIMESTONE (*Chemstone*)
SPEEDI-DRI FLOOR ABSORBENTS

OPINION

Aura, not Ora

TO THE EDITOR: Of interest to us was your article titled "Chlorophyl's Rival" (*Aug. 31, p. 134*). Among the turf dyes mentioned is "Mallinckrodt's Oragreen."

Undoubtedly the product in mind was our Auragreen.

S. A. FREDERIKSEN
Industrial Sales Division
Mallinckrodt Chemical Works
St. Louis, Mo.

Lanolin Derivatives

TO THE EDITOR: A statement in CHEMICAL WEEK (*Sept. 7, p. 98*) concerning acetylated and propionylated lanolin was followed by this paragraph: "N. I. Malmstrom and Co. (Brooklyn), Robinson Wagner Co. (New York) and American Cholesterol Products (Edison, N. J.) are leading producers of these lanolin derivatives and so-called 'purer' lanolins."

The latter paragraph is incorrect and has led to much confusion. We are the only manufacturers of these products, holding both U.S. and foreign patents, a fact that was well known to pharmaceutical and cosmetic manufacturers until the Sept. 7 issue was published. We have since had many inquiries from companies that had tried to buy or obtain samples of these special derivatives from competitive companies, and had not been advised that we were the sole manufacturers.

This incorrect and misleading statement should not stand without change. We trust you will set the records straight . . . by stating that American

CW welcomes expressions of opinion from readers. The only requirements: that they be pertiment, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

Using Salt Efficiently

by **INTERNATIONAL SALT COMPANY, INC.**—America's largest producer of salt

How to Sample Rock Salt for Screen or Chemical Analysis

Sampling bulk rock salt accurately is often a difficult problem. For when salt is stored in piles, coarser particles collect at the foot of the pile—while finer particles remain inside and at the top. A few handfuls of salt taken at random from the outside and bottom of such a pile almost always mean an inaccurate sample for analysis. Also, during transportation and handling, salt particles of different sizes tend to become segregated.

However, by following a few simple steps, you can easily obtain salt particles of a truly representative size range. This sample will then give accurate results in any type of screen or chemical analysis. Here are the modern sampling techniques approved for most plants where salt is used:

Stockpile sampling of bulk salt. Samples from either indoor or outdoor stockpiles should be taken at three separate points: at the top of the pile, at the base, and at one intermediate point. The sample taken at the intermediate point must come from deep within the pile. To prevent segregation of salt particles during this sampling procedure, a board should be pushed into the salt pile just above the point from which the sample is taken.

Sampling bulk salt in railroad cars or trucks. In sampling a boxcar load of salt, three trenches should first be made in the salt across the width of the car. The bottom of each trench should be at least 1 ft. below the surface of the salt, and approximately 1 ft. wide. Equal portions of salt can then be taken from nine equally spaced points along the bottom of each trench. Two of the nine points should be directly against the sides of the boxcar. Sampling in these trenches is best accomplished by pushing a shovel or sampling tube directly into the salt, and not by scraping horizontally.

The same general procedure may be used effectively to sample truckloads of rock salt.

Sampling between transport and storage. Rather than sample bulk salt in cars or in storage, many companies feel that more accurate samples can be taken during unloading—at some point in the handling process where a flowing stream of salt is accessible on all sides. The points at which salt leaves a head pulley or drops from a chute lip are two of the most desirable places for this type of sampling.

This "running sample" gives consistently excellent results, but it must meet the following conditions as closely as possible:

1. To obtain salt particles of all sizes, the sampling scoop must move at uniform rate across the entire *width* of the stream. Samples will generally be inaccurate if the scoop moves through the stream from front to rear.

2. The sampling interval should be uniform. And it is better to take small samples frequently than a few large samples.

3. The sampling scoop should have a relatively long rectangular opening, permitting a knife-like cut across the stream. The use of pails or shovels to sample the stream may produce an inaccurate sample.

4. Sampling should take place on a regular stream flow. When taken from an intermittent flow, samples may not be representative. Also, sampling should be carried on throughout the entire unloading period.

Moisture content. Samples should not be taken from bulk rock salt which has recently been exposed to rainfall or excessive humidity. Under these conditions, the proportion of insolubles will increase due to the leaching out of a certain amount of salt. Resulting analysis will then show a higher degree of impurities and a lower sodium chloride content than is normally present.

Finally, it must be remembered that no matter where the salt is sampled—the larger the sample taken, the more representative it will be for final analysis. In fact, many industries require a gross sample of at least 100 lb. from one carload of salt. This sample is then reduced to about 5 lb. for laboratory work.

TECHNICAL SERVICE WITH YOUR SALT

Through skilled and experienced "Salt Specialists," International can help you get greater efficiency and economy from the salt you use. International produces both Sterling Evaporated and Sterling Rock Salt in all grades for industry. And we also make automatic dissolvers in metal or plastic for both types of salt. So we have no reason to recommend one type of salt over another; we simply recommend the type and size of salt most perfectly suited to your needs.

If you'd like the assistance of an International "Salt Specialist" on any problem concerning salt or brine—or further information on salt sampling and analysis—just contact your nearest International sales office.

International Salt Co., Scranton, Pa.

Sales Offices: Atlanta, Ga.; Chicago, Ill.; New Orleans, La.; Baltimore, Md.; Boston, Mass.; Detroit, Mich.; St. Louis, Mo.; Newark, N.J.; Buffalo, N.Y.; New York, N.Y.; Cincinnati, O.; Cleveland, O.; Philadelphia, Pa.; Pittsburgh, Pa.; and Richmond, Va.

Sampling Tube Is the Simplest Method

Most sizes of rock salt can be sampled from stockpile, bins, trucks, or railroad cars by means of a simple sampling tube approximately 1¼" in diameter and about 6 ft. long. Five to eight insertions of this tube into the salt will furnish a sample of about 10 lb. Some of the best tubes for sampling rock salt are those sold for testing grain. They have about 12 openings and a special auger point.

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DAY Hy-R-Speed Mills insure economical, fast, quality production, and you save 3 ways:

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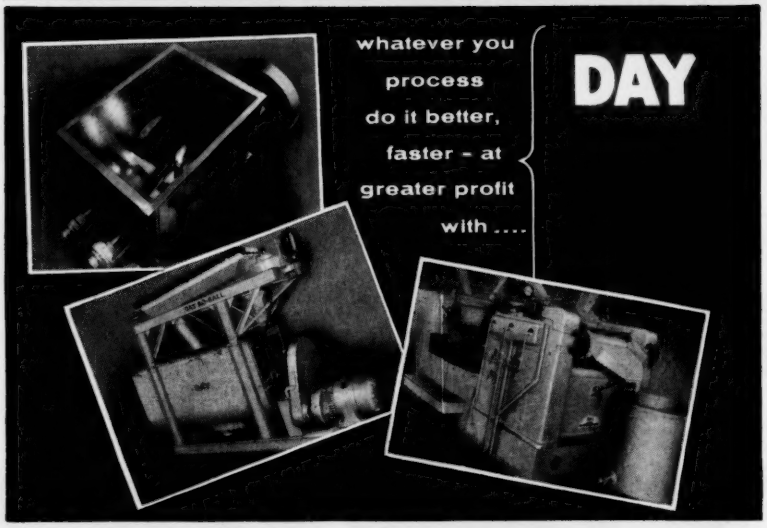
Write for new bulletin

Division of The Cleveland Automatic Machine Co.



The J. H. DAY Co. *Division of The Cleveland Automatic Machine Co.,*
4928 BEECH STREET, CINCINNATI 12, OHIO

OPINION

Cholesterol Products, Inc., is the sole manufacturer of acetylated and propionylated lanolin derivatives.

LESTER I. CONRAD
Vice-President
and Technical Director
American Cholesterol Products, Inc.
Edison, N. J.

CW thanks Reader Conrad for his comments. There was an ambiguity not intended by CHEMICAL WEEK. *CW, in the paragraph previous to the one quoted by Reader Conrad, was commenting about lanolin derivatives generally, citing acetylated and "propionylated" lanolin merely as examples. All three companies listed in the story are engaged in manufacture of lanolin derivatives, as* CW *pointed out.*—ED.

Multiply by 1,000

TO THE EDITOR: . . . Petrochemical production *(Charting Business, Aug. 24)* hit 60 million lbs. a long time ago. Apparently you meant billion and not million.

It is interesting to note that your 1960 estimate of 60 billion lbs. of petrochemicals represents a 70% increase over the '56 total of approximately 35 billion lbs., indicating an annual growth of 15% over the next four years. Such a rate of growth seems to explain why the petroleum industry is increasing petrochemicals' share of capital expenditures.

FRED A. ESCHERICH
Market Research & Analysis Dept.
Socony Mobil Oil Co., Inc.
New York

"Billion" is certainly right, and petrochemicals are certainly big business, as our Sept. 28 CW *Report shows.* —ED.

As Individuals

TO THE EDITOR: The article "Brighter Opportunities Dawning for the Negro Worker" *(CW, Aug. 24)* made its most telling point, it seems to me, in the final sentence, which ended ". . . the problems created by racial differences are artificial and can be solved."

A straightforward, uncomplicated approach to the basic problem would be for employers to judge individual Negroes as individuals, just as non-Negroes are now judged in most cases. If a white Protestant Anglo-Saxon

CONTENTS:

BROMINE CHARACTERISTICS

BROMINE AND THE DOW CHEMICAL COMPANY

REACTIONS OF BROMINE

SAFETY PRECAUTIONS
- Toxicity
- Safe Handling Practices
- Personal Protective Equipment
- Decontaminants
- Bromine Spillage

HANDLING AND EMPTYING BROMINE SHIPPING CONTAINERS
- Bottles
- Monel Drums
- Tank Cars

MATERIALS AND METHODS FOR HANDLING BROMINE
- Materials of Construction
- Control Devices
- Laboratory and Pilot-Plant Use
- Semi-plant and Commercial Use
- Fittings

FIRST AID
- Exposure to Vapor
- Skin and Eye Contamination

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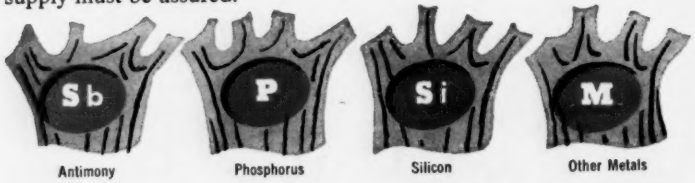
ORGANO METALLICS

* R_nSnX_m—In this formula R may be alkyl or aryl; **Sn** represents the metallic element Tin; and X an electro-negative group such as halogen, oxygen in substituted groups of the alkoxide, acid radical or hydroxide type, or electro-negative sulfur-containing groups. n+m must equal valence of **Sn**

■ For years Metal & Thermit has been the world's foremost producer of organic derivatives from the element Tin. Although each has its own distinctive properties, all have a strong metallic nature, and are generally characterized by remarkable stability. Today, Metal & Thermit organotin compounds are in demand by many industries for applications where chemical stability is needed and dependability of supply must be assured.



Antimony Phosphorus Silicon Other Metals

Continuous research by M&T personnel experienced in the commercial development of organometallics is producing a variety of new organo compounds for commercial use. The most recent of these are based on Antimony, Phosphorus, Silicon, and a few other metals.

M&T Organo-Metallics are serving or being investigated for use as catalysts, antioxidants, stabilizers, fuel and lubricity additives, anthelmintics, bactericides, fungicides, insecticides and herbicides. Inquiries on specific organo-metallic compounds for these or other uses will receive our prompt attention . . . just write Market Development Division . . .

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OPINION

applies for a job, he is not immediately hired without further ado, nor is he immediately turned down. Instead, his individual qualifications are examined, and he is judged on his record as an individual. He is not judged on the basis of what someone believes are the characteristics common to white Protestant Anglo-Saxon people as a group, or the characteristics common to blondes, brunettes or redheads, or left-handed people or right-handed people. This is exactly the way it should be, and it is the way any individual should be judged, whether he be w. P. A.-S.; Irish Catholic; Jewish; Mexican; Lithuanian, or Eskimo.

LEWIS D. HALL
Palo Alto, Calif.

MEETINGS

Salesmen's Assn. of the American Chemical Industry Inc., sixth chemical sales clinic, Roosevelt Hotel, New York, Oct. 14.

Sanitation Maintenance show and conference, Chicago's Navy Pier, Oct. 14.

Assn. of Official Agricultural Chemists Inc., 71st annual meeting, Shoreham Hotel, Washington, Oct. 14-16.

Time-Life International and **Stanford Research Institute,** international industrial development conference, Fairmont Hotel, San Francisco, Oct. 14-18.

Society of Mining Engineers of The American Institute of Mining, Metallurgical and Petroleum Engineers, southeastern mining conference, Hotel Hillsboro and Hotel Tampa Terrace, Tampa, Oct. 15-18.

Society of the Plastics Industry, second annual conference on cellular plastics, Hotel Commodore, New York, Oct. 16.

Society of Plastics Engineers, regional technical conference; theme: polyethylene properties and uses; Hotel Carter, Cleveland, Oct. 17.

Magnesium Assn., 13th annual convention, Biltmore Hotel, New York, Oct. 17-18.

American Society for Quality Control, chemical divisions, first annual meeting, Benjamin Franklin Hotel, Philadelphia, Oct. 18-19.

Assn. of Consulting Chemists & Chemical Engineers, annual meeting, Belmont Plaza Hotel, New York, Oct. 22.

Packaging Institute, 19th annual forum, Hotel Statler, New York, Oct. 28-30.

Industrial Hygiene Foundation, 22nd annual meeting, Mellon Institute, Pittsburgh, Oct. 30-31.

A HANDFUL OF TROUBLE: John C. Wisser, Foreman at Harbison-Walker's new Leslie (Md.) plant compares finished refractory brick with raw silica dust. This dust is collected by the Dracco Multi-Bag Filter (background), preventing material waste and dusty plant air.

Dracco dust control keeps new plants new

There's something exciting about a new plant. It symbolizes the success and progress of your company.

Uncontrolled dust can spoil the picture before you know it: maintenance and cleaning costs rise—machines become worn—efficiency is affected by dirty plant air—valuable material is wasted.

The time to solve dust problems is before the plant is built. Dracco engineers working hand-in-hand with your plant engineering staff can plan a dust control system which will prevent dust from polluting plant air or the atmosphere and keep employees and machinery working like new.

Harbison-Walker Refractories Company is typical of forward-thinking companies who pre-plan for production efficiency. Their new ultra-modern plant in Leslie, Maryland, uses Dracco Dust Control to prevent spread of dust from grinders and belt conveyors.

If your company is planning a new plant, or an expansion of your existing facilities, it will pay to look ahead with Dracco.

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Bulletin 800 is Dracco's 40-page catalog on dust control and recovery. Contains detailed facts and figures on all dust control equipment. For your copy, write Dracco today.

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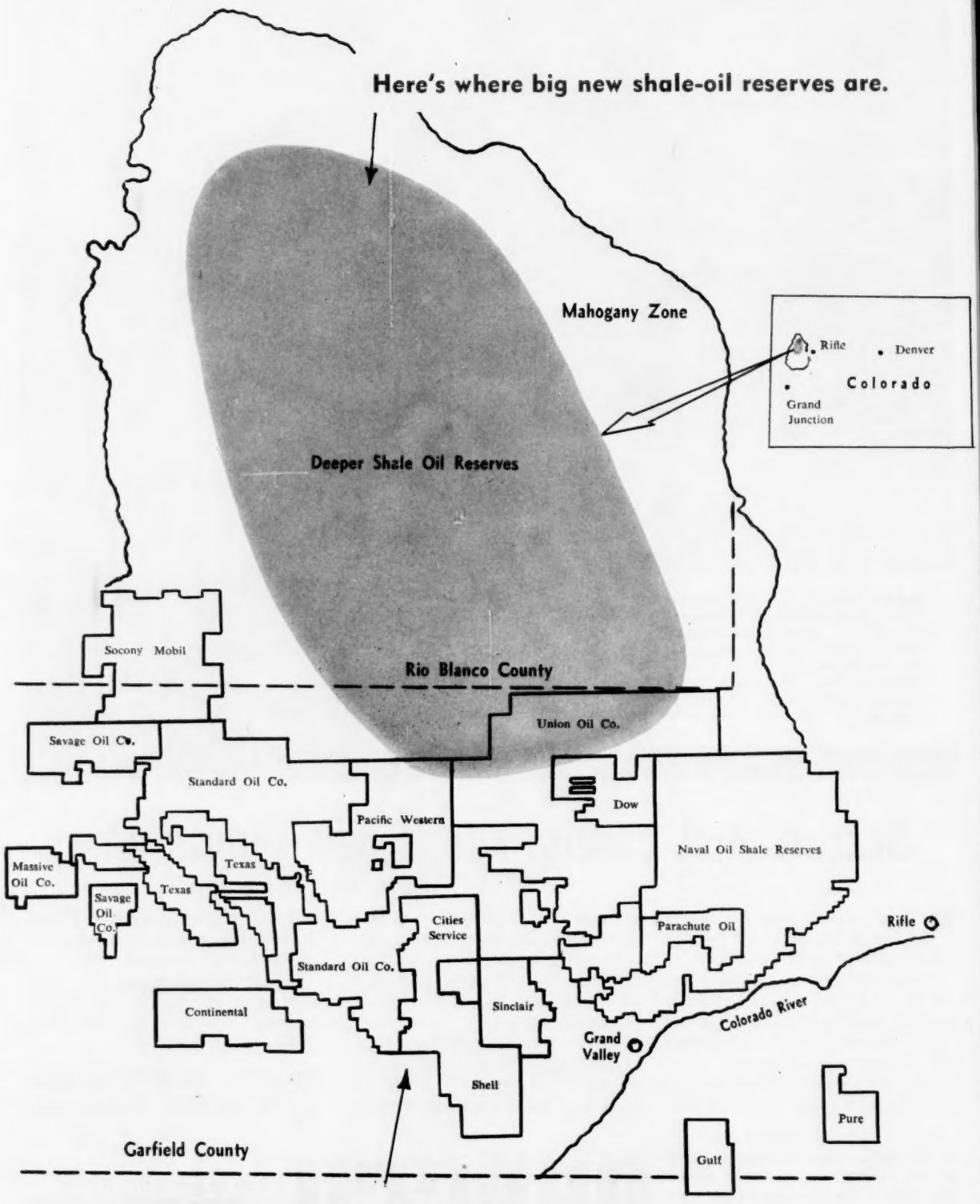
dust control equipment


Here's where big new shale-oil reserves are.
Mahogany Zone
Rifle
Denver
Colorado
Grand Junction
Deeper Shale Oil Reserves
Socony Mobil
Rio Blanco County
Union Oil Co.
Savage Oil Co.
Standard Oil Co.
Pacific Western
Dow
Naval Oil Shale Reserves
Massive Oil Co.
Texas
Texas
Savage Oil Co.
Cities Service
Parachute Oil
Rifle
Standard Oil Co.
Continental
Sinclair
Colorado River
Grand Valley
Shell
Pure
Gulf
Garfield County
Here's where companies bought land.

Chemical Week

October 12, 1957

New Finds Spur Fresh Look at Shale Lands

This week, the Office of Naval Petroleum Reserves will start accepting bids from private companies for contracts to test and research shale-oil reserves on the Navy's property in northwestern Colorado.

The move puts the spotlight on newly found and so-far-idle shale deposits in the area—about 1.2 trillion bbls.—which may be the raw material for a brand-new industry in Colorado, and a vital new source of petroleum for the U.S.

The Navy's reserves represent only a small fraction of the total known deposits, which are spread over a wide area covering northwestern Colorado in both Garfield and Rio Blanco counties (*see map*).

It was thought that the thickest deposits were in the so-called Mahogany Zone, a portion of the Mahogany Ledge, which extends through Colorado, parts of Utah and Wyoming. But when Pacific Northwest Pipeline Corp. laid its gas pipeline up through the area, to Seattle, it drilled several wells, took samples, and found two new 1,000-ft.-thick shale-oil strata lying 500 and 1,000 ft. below the surface—in the northern part of the Mahogany Zone. This land is in the public domain, is controlled by the U.S. government.

The big oil companies two years ago bought up land in the zone's southern part—where shale oil is still ample, but not as concentrated as in the land to the north.

The companies bought the land following earlier reports based on a probe of the area by U.S. Geological Survey. The latter estimated that about 900 billion bbls. of oil could be extracted there. The discovery of the two new layers to the north has upped the estimate to 1.2 trillion bbls. of available and extractable oil.

The precise extent of the new deposits isn't accurately known yet. But a rough outline is gained from rotary-drilling samples of new wells (*map*).

No Land Rush: As yet, there hasn't been any mad scramble to buy lands and mining rights to the deeper-lying reserves. Reason: the land is government-owned, has been unavailable for leasing since 1930. The only claims recognized are valid claims made before 1920. So, although it's not impossible for a private company to obtain rights to the land, it would be difficult, since the firm would have to buy valid, hard-to-trace mining claims from someone else.

And there's the question of whether adequate water supplies for processing can be provided. There's enough water now, but a major runoff takes place during the spring months. The only solution, experts say, is to build storage reservoirs for the dry season. Observers say the industry will have to store water for 265 days each year, taking direct flow for only 100. But it's thought that careful engineering can solve the problem.

Already, the U. S. Bureau of Reclamation for Debeque Canyon has proposed a dam for one reservoir on the western edge of the deposits. Other sites are also under consideration.

There's also the problem of whether the oil can be economically extracted from the shale. One prominent oil man says, "The oil would have to sell for $5/bbl. As things stand now, it's nowhere near that."

The process now being used by Union Oil Co. involves grinding the shale, then applying heat to distill off the crude petroleum in a retort. Latest reports say it's working "remarkably well."

Standard Oil, which also owns big acreage in the Mahogany Zone, is working some shale-oil claims in Canada in a similar manner.

Recent tests also show that a Swedish developed process, called Aspeco, may be competitive with Union Oil's retort for extracting the oil. Another model, developed by the U.S. Bureau of Mines is also being checked.

When and If: In time—when and if these methods prove commercial—big oil firms have indicated they'll start working their claims, probably will put out feelers to get hold of the land to the north that has deep-lying reserves.

When they do, Colorado could be in for a big boom. A report by John G. Wells and Charles H. Prien, Denver Research Institute, states that the new industry will create a metropolitan area close to the small town of Grand Valley. The report says a town of 340,000 people will spring up, and huge retort units will process 1.5 million tons of crushed shale rock, to produce 1 million bbls./day of crude shale oil.

It also predicts that "the mines, plants, pipelines, refinery and employee housing will require a capital outlay, over a period of years, of $7.8 billion, nearly $7 billion of which will be invested in Colorado. Annual operating expenses for maintainance will require $236 million. The Colorado payroll will be a whopping $387 million/year."

This optimism may be well founded, despite the high investment cost, about $7,800/bbls./day. Exploration, production refining and distribution of crude oil, it's estimated in the report, will cost this much in the period 1960-75 if new U.S. oil requirements are to be met—whether shale is used or not.

First Step: Until now, however, the government hasn't pushed plans to utilize the deposits. The Bureau of Mines did carry out retort and mining experiments at its plant in Rifle, Colo., for some years. But Congress hasn't recently appropriated any money to keep it going, so the plant lies idle.

It's thought that the government's invitation to private companies to bid for research contracts may be the first active step in developing the government land.

MASSAR—BLACK STAR

U.S. investment, such as this Celanese plant, may be spurred by . . .

New Mexican Trade Force

U. S. chemical firms operating in Mexico found a new friend last week in a newly formed trade organization that strongly favors American investment in Mexican chemical ventures.

Chemical industry leaders there who have long been dissatisfied with the present trade organization, Camara Nacional de Industrias de Transformacion (National Chamber of Industries of Transformation), have formed their own unit. Until quite recently, chemical firms in Mexico had no choice but to belong to CNIT—an organization set up under Mexican law to represent all companies of all industries. They were forced to belong simply because no chamber existed specifically for the chemical industry.

CNIT has for the past few years been governed by anti-U. S. forces. It has fought the advent of U. S. capital and on many occasions has tried to make life difficult for foreign firms. Proforeign capital interests have accused these anti-U. S. interests of waving the Mexican flag for privately selfish interest; that is, to protect themselves from competition.

Storm Brewing: But early this summer, a concerted action of several chemical industry leaders got things rolling toward creation of Camara Nacional de La Industria Quimica (National Chamber of the Chemical Industry).

When the new chamber decided to break away from CNIT, it rounded up a group of 34 companies. Now the number has grown to 41 Mexican and foreign firms, representing 7,387 employees and a total investment of $80 million.

Large Group: Altogether, there are some 300 firms in Mexico that can qualify as members of the new chemical chamber. Its leaders, though, aren't forcing the membership issue yet because government recognition—by official registration—hasn't been granted. Organizers say, however, they can see no legal way the government can deny them official registry; and if it isn't granted by the end of October, they intend to demand it.

Once official recognition is granted, all chemical companies would be forced by law to belong to the new chamber.

The new chamber is expected to smooth many problems faced by firms in CNIT. Says one of the organizers: "It was not only for ideological reasons that we decided to break away—the chemical industry was not getting proper representation. And there were conflicting interests in the chamber that canceled out its effectiveness."

The new chamber's membership is now made up of a 50-50 representation of Mexican and foreign firms. Among U. S.-affiliated firms that are members of the new chamber are Reichhold Chemicals de Mexico, Geon de Mexico (Goodrich Chemical Co.), Monsanto Mexicana, Celanese Mexicana, Du Pont, S. A. de C. V., Bakelite de Mexico (Union Carbide), Casco Quimica de Mexico (Borden), Pennsalt de Mexico, Mathieson Quimica, S. A. de C. V.

Officers of the new chamber include Enrique Uhthuff, of Monsanto Mexicana secretary), and Arsenio Salazar, of Celanese Mexicana (treasurer).

Sputnik Spurs Effort

Mass speculation was the order of the day early this week concerning details of the propulsion system of Russia's Sputnik — the 184-lb. moon circling some 500 miles above the earth.

Scientists the world over speculated on everything from a system of four rockets to the idea that the last-stage rocket was still attached to the satellite. But accurate data was still a Russian secret.

From what the Russians did say, coupled with astronomical observations made around the world, scientists are hoping to set some limits on such fundamental issues as rocket-power requirements for firing the missile, orbital speed and dimensions, firing speeds, and other derivable information.

Implications: The satellite's political implications are a lot clearer than its scientific details:

- Diplomatically, successful firing of the missile is a powerful weapon for Communist persuasion of wavering nations.
- Militarily and scientifically, it indicates the Russians are well advanced in the race for development of powerful missiles.
- Economically, there's little doubt that to overcome these Russian advantages increased emphasis will be put on the U. S. missile development program, with its stringent demands for research (*see also p. 148*), materials and know-how.

Gas Suppliers Fracas

Cabot Carbon Co. is running into gas-supply problems at the new silicon dioxide plant it's building at Tuscola, Ill. Fuel suppliers in the area are arguing over who will sell the gas to Cabot.

Last week, Citizens Gas Co. filed a brief with the Illinois Commerce Commission claiming that Panhandle Eastern Pipe Line—which supplies much of the gas to existing chemical works at Tuscola—is required under its rate tariff to offer certain quantities of interruptible gas to its utility customers so they may supply it to industries. Panhandle also supplies Citizens Gas.

Citizens claims that the interruptible gas that Panhandle would supply to Cabot would be at a higher rate than Citizens would charge Cabot if it were intermediate supplier. The brief asserts that the Panhandle plan would put the pipeline company in direct competition with its own customer.

Citizens claims that sale of gas to Cabot is different from sale to National Petro-Chemicals—supplied by Panhandle—because NPC extracts hydrocarbons from the gas, then returns it to the line. Cabot, on the other hand, would consume its gas.

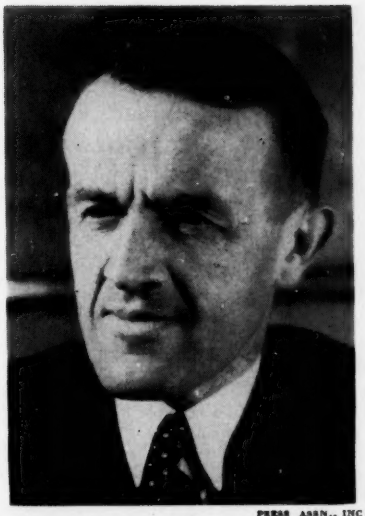
Defense for Gas Users?

A "public defender" system to fight gas-rate increases in the Kanawha Valley may be the outcome of the latest request for a rate hike by United Fuel Gas Co., largest supplier of industrial gas in the West Virginia-Kentucky area.

UFG is asking the West Virginia Public Service Commission for permission to increase its gas rates $4 million/year so it may get a "fair profit" from its operations. This is on top of a $1.5-million increase scheduled to go into effect Dec. 17.

Hearings on the new boost, scheduled for Nov. 25, may come too soon for effective "defender" action. Companies such as Du Pont, Union Carbide, Westvaco, Diamond Alkali and Monsanto have not publicly protested the prospective rates.

But West Virginia legislators say the state government should pass new laws to appoint a public defender to represent users at PSC hearings and argue against rate increases.



PRESS ASSN., INC

Swiss Minister Petitpierre: A fundamental principle is involved.

Swiss to Sue for GAF

The Swiss government last week said it would sue the United States in the International Court of Justice for return of the General Aniline & Film Corp. to its former owner—the Swiss Corporation, Interhandel.

Swiss Foreign Minister Max Petitpierre said that a much more fundamental issue was involved than the question of whether the former owners of GAF were German "tainted," as the U.S. has claimed. He said the basic principle involved "the importance of international agreements that provide for arbitration of disputes that cannot be settled in a friendly manner."

He was referring to the question of whether the United States will accept jurisdiction of the World Court in the matter under agreements made in 1931 and 1946 with Switzerland. U.S. officials claim the question of court jurisdiction can't be decided until the formal Swiss complaint is presented. A reservation under the agreements allows the United States to decline World Court jurisdiction in matters of "domestic jurisdiction."

U.S. officials indicate that the long drawn-out case is so complex that many months may pass before action can be taken. Thus far U.S. courts have ruled that this country can sell the seized GAF assets because previous GAF ownership was tainted by German interests in World War II.

Aluminum Go-Ahead

Alcoa Aluminum may get the green light next week for two big industrial projects in Badin, N. C.

The Federal Power Commission has scheduled a hearing for Oct. 15 on an application by Carolina Aluminum Co. (Badin), a subsidiary of Alcoa, designed to clear the way for a $20-million addition to the Badin plant, necessitating construction of a $14-million dam across the Yadkin River. The dam would provide an additional 40,000 kw. of electricity for aluminum processing.

FPC has already granted a 50-year operating franchise for the proposed dam and has authorized the company to build it. The commission has also granted 40-year operating franchises for the aluminum firm's three existing dams on the Yadkin—with a combined capacity of 135,000 kw.

Uniformity: At next week's hearings, Carolina Aluminum will ask that these 40-year agreements be extended another 10 years so that it may have uniform 50-year franchises for all its power facilities.

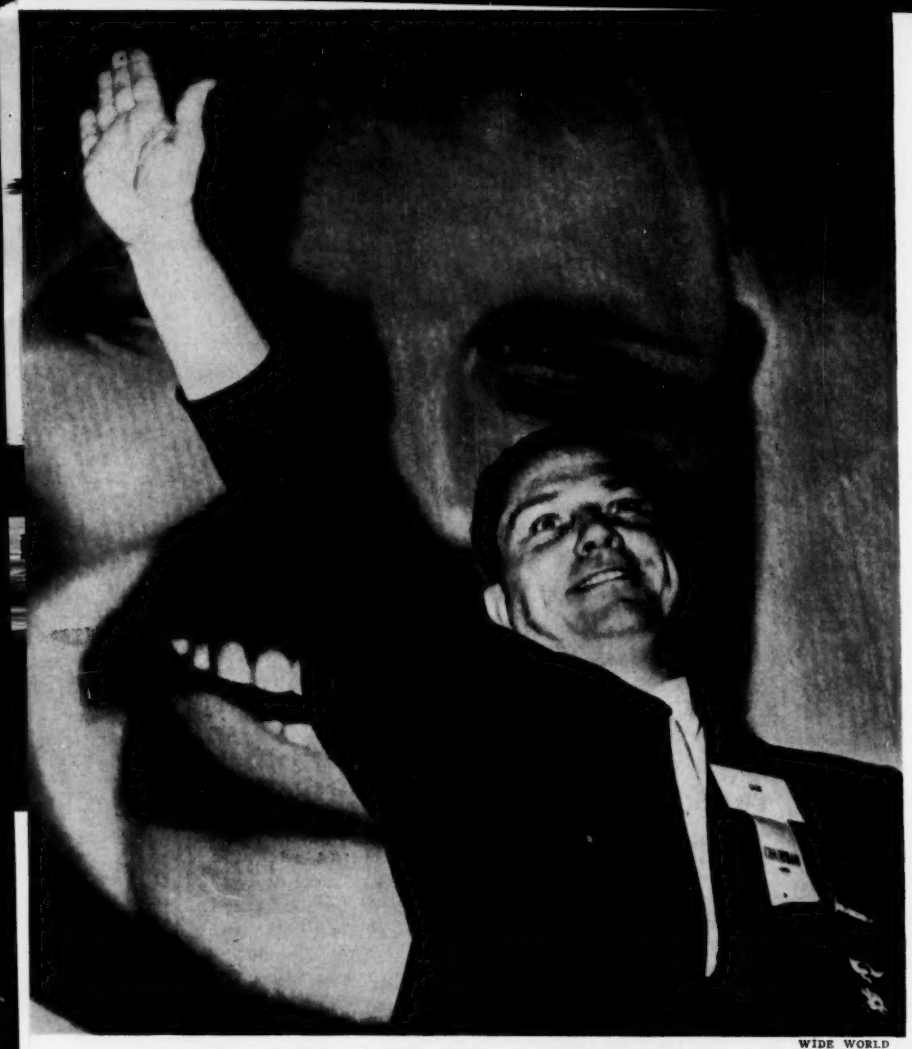
If this request is granted, the company will go ahead with the $20-million expansion of its plant and construction of the new dam.

Atom Agency Starts Up

First meetings of the International Atomic Energy Agency got under way in Vienna, Austria, last week as 300 delegates from 50 countries met to set up a program of activities for the new organization.

The Vienna meetings are primarily designed to initiate the organization, choose a location for headquarters and set up an administrative body. Late last week, a board of 10 governors was elected amid politicking by Eastern and Western delegates. It's expected that little will be accomplished at this session toward actually getting a program under way, but more substantive measures are expected in '58.

Of most immediate interest to American chemical processors will be the definition of what reactor-development program the agency will undertake. On the basis of this program, exchange of reactor materials and know-how among the member countries will then get under way.



WIDE WORLD

Teamsters' Hoffa: Cheers, some jeers for the victor.

New Face in CPI's Future?

Last week, a controversial Teamsters union elected an equally controversial man as its president—James R. Hoffa. Reaction among chemical management ranged all the way from tongue-clicking disapproval to cautious optimism. Hoffa, whose union seeks to organize chemical workers, as well as those who transport chemical products, was elected by a wide majority.

Queried on what the election meant to his company, one traffic manager of a large chemical firm said the Teamsters union is "so corrupt all the way down the line, it doesn't make any difference who is president." But another manager, with one of the biggest pharmaceutical companies in the U. S., countered that "We've always been able to deal with Hoffa successfully. Though I believe the union is corrupt, I don't think, from a contract-negotiating point of view, we could do any better than with Hoffa."

Middle Ground: Other comments fell somewhere between these two. But the general feeling is that, with Hoffa's iron-handed hold on the union, the probability of wildcat strikes is lessened. However, there is now greater probability of legislation to regulate unionism because of an aroused public awareness of the union's—and Hoffa's —questionable practices.

Hoffa's election came as no surprise. Though it looked for a while as if strong opposition was building, a decision by Supreme Court Justice Earl Warren to let stand a lower-court decision disallowing an election postponement carried the tide. This was in spite of some scathing accusations against Hoffa by the McClellan Crime Committee.

As ICWU Sets Sights

Charges of corrupt practices also are expected to be aired at next week's International Chemical Workers Union (AFL-CIO) convention in Detroit's Sheraton-Cadillac Hotel, but this will probably be only a minor item on the agenda.

The big question facing the 450 or more delegates expected to attend: whether to increase the monthly per capita tax—currently $1.25—by 50¢, with extra revenue to go into a special strike fund proposed as a tool for more aggressive wage bargaining.

Off Year: This is an "off-year" for elections; President Walter Mitchell and the other officers chosen at last year's convention in Buffalo, N. Y., will serve through '58.

Various important constitutional changes will be taken up next week. These resolutions have been studied by union committees, and their reports will be major items on the convention agenda.

Among the proposed changes:

- To establish company-wide and subindustry-wide councils on an official and more authoritative basis.
- To eliminate "lame duck" tenure of outgoing officers.
- To reduce the number of vice-presidents (nine at present), and set up a number of regional-director positions.

The convention will hear Mitchell's report on how he has dealt with several local unions assertedly dominated by racketeers, and a report by the special rank-and-file committee on charges brought up last year concerning allegedly improper handling of insurance funds by certain union officials in New Jersey.

Speakers: Principal guest speaker will be K. C. Towe, chairman of the board of American Cyanamid Co. Considerable industry interest will focus on what Towe will say, inasmuch as his company recently modified its stand against multiplant bargaining to the extent that it conferred with representatives of ICWU and other unions before drawing up its new company-wide pensions and insurance program (*see p. 82*).

Mitchell and O. A. Knight, president of Oil, Chemical & Atomic Workers (AFL-CIO), are expected to report on progress in merger negotiations.

EXPANSION

Phthalic Anhydride: Reichhold Chemicals (Canada) Ltd., Canadian subsidiary of the U.S. firm, will boost production at its phthalic anhydride plant in Ste. Therese, Que., by 2 million lbs./year. The company reports for the first six months of 1957 a 25% increase in phthalic anhydride sales over the same period last year.

•

Styrene: Monsanto Chemical's plastics division will double the capacity of its styrene plant in Springfield, Mass. Completion of new construction is slated for May '58.

•

Coal Tar: Dominion Tar & Chemical Co., Ltd., is blueprinting a new continuous tar-distillation plant at Hamilton, Ont. Designed to process 15 million imperial gal./year of tar, the new unit will produce solvents, tar-acid oil, naphthalene, creosote and pitch products. Completion is slated for the summer of '58.

•

Ammonia-Phosphoric Acid: Coastal Chemical Corp. and First Mississippi Corp. have signed a contract for installation of a phosphoric acid concentrator at Coastal's new fertilizer plant now abuilding near Pascagoula, La. First Mississippi will build the new unit for lease to Coastal.

•

Barium: P&R Barium Co. is now building a $75,000 floatation plant in Draytonville, N.C. The plant will refine barite ores now being mined in the area, will produce mud-grade barium sulfate used in drilling for oil. The new unit is scheduled to begin operating by Nov. 1.

COMPANIES

Johns-Manville Corp. and Bestwall Gypsum Co. have called off merger plans. Last month, directors of both companies said they had agreed "in principle" to merger plans that involved an exchange of stock valued at $40 million (*CW, Sept. 21, p. 46*). The deal, however, was contingent on financial and engineering arrangements then being negotiated. Now the companies say "preliminary investigations show . . . a merger at this time is not feasible." Neither firm would give further details.

•

Liquid Carbonic Corp. and General Dynamics Corp. stockholders have approved a merger of the two firms. Each Carbonic shareholder will receive one share of General Dynamics for each share of Liquid Carbonic. Liquid Carbonic will then be known as Liquid Carbonic division, General Dynamics Corp.

•

Texas International Sulphur Co. (Houston) has acquired all the assets of Standard Sulphur Co. (Damon Mound, Tex.). Purchase price was about $400,000 in cash and stock. Texas International's president, Dale Major, said the Standard plant in Brazoria County is already being disassembled and will be ready for shipment to Mexico within two weeks.

•

Dow Chemical Co. (Midland, Mich.) will offer 200,000 shares of its common stock to its employees. It is the ninth such offering since Dow began selling shares to its employees on an installment basis. Buyers will be able to subscribe up to 10% of their annual salary for the stock at a price to be announced later this month.

•

Directors of American Can Co. and Marathon Corp. are exploring merger possibilities. Though no definite agreement has been reached, American Can's president, John Stevens, confirmed that merger discussions were already under way. If approved, the annual sales of the new firm would total well over $1 billion.

•

General Tire & Rubber Co. (Akron) is acquiring Castle Rubber Co. (Butler, Pa.), rubber products manufacturer. Terms were not disclosed.

FOREIGN

Industrial Gases/Dominican Republic: A plant for manufacture of oxygen, acetylene and textile materials has been built by a newly formed firm, Empresas Industriales, C. por A., near Ciudad Trujillo.

•

Catalytic Agents/Holland: American Cyanamid is paying half the costs of a new joint venture to manufacture catalysts for use in Esso refineries outside the U.S. Royal Sulfuric Acid Factories (Amsterdam) will build the plant in Holland. Cost: $2.1 million.

•

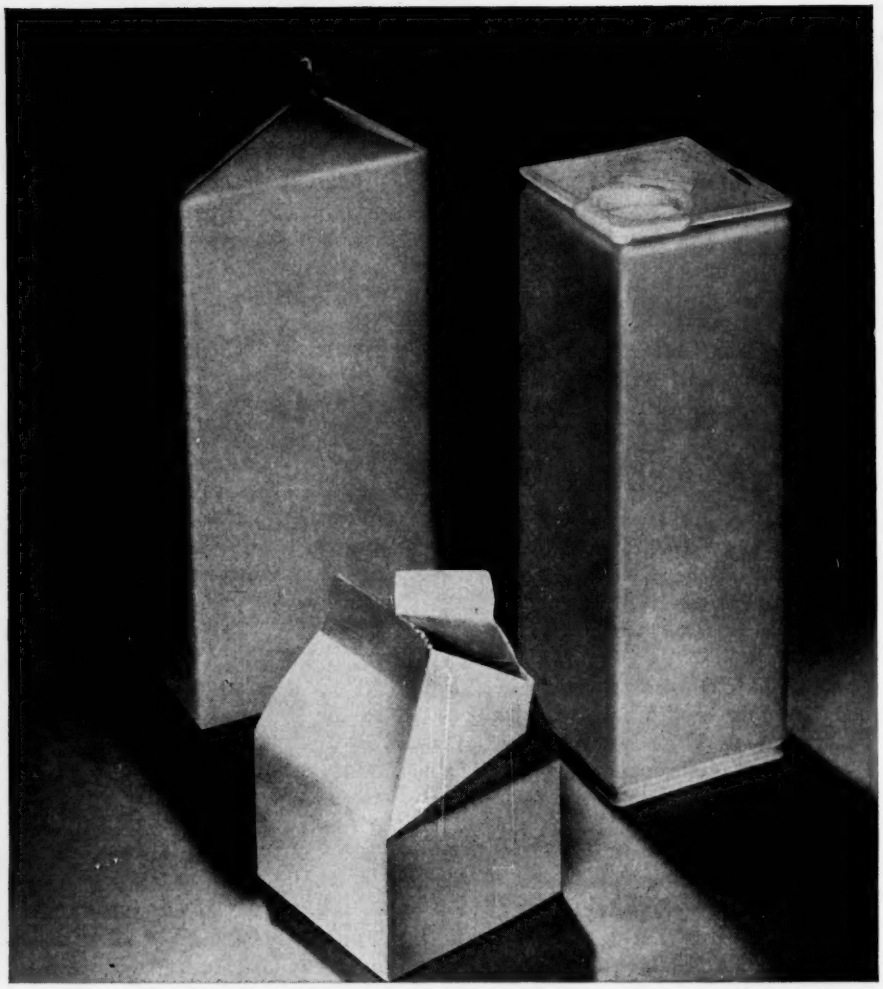
Asphalt/Jamaica: A 1,000-tons/year synthetic bituminous asphalt plant in Jamaica, B.W.I, will soon turn out material for road and airfield building programs. It was built by Morin Scott, an industrialist formerly associated with United Molasses Co., Ltd. (England).

•

Vinyl Acetate Monomer/Australia: C.S.R. Chemicals Pty. Ltd. (Sydney) will build a $1.3-million vinyl acetate monomer plant to begin operation in '58. British Celanese Ltd. will provide know-how and technical assistance in construction of the unit.

•

Sulfuric Acid/Poland: The first Polish plant to make sulfuric acid from domestic sulfur will be built by the Polish government. Construction, to begin in the spring of '58, will be directed by an unnamed French firm. Onstream date has been set for late '59. The unit will be built near Thorn; a second unit is planned at Tarnobrzeg. Capacities of the plants have not been revealed.



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Washington
Newsletter

CHEMICAL WEEK
October 12, 1957

Look for a real brawl on farm price supports in Congress. Agriculture Secretary Benson has the once-potent farm bloc split wide open, and Republican party strategists have pretty much written off the farmer as a major political asset in national elections. Benson is lobbying hard, seeking to convince farmers that the high price support programs initiated in wartime are anachronistic in today's surplus markets—marked by increasing competition from overseas growers. His pitch is beginning to convert some farmers—and is impressing city voters.

Producers are gearing for a last-ditch stand. Last week, 35 farm commodity groups formed The National Conference of Commodity Organizations to heal the breach in farm-bloc ranks. But, insiders say the new harmony effort got off to a bad start, has come too late to stem a growing split. They're predicting failure.

The conference's diverse makeup sounds impressive. But, it's known that important groups—moderates like the powerful American Farm Bureau Federation, ardent backers of Benson's flexible price support ideas—are staying out. Other moderate groups are giving it a wide berth, too, as are the processors of farm materials (e.g., soap, paintmakers —big users of fats and oils). The influential National Cotton Council, after a row over which group should represent cotton growers, failed to show up at the most recent conference powwows. Seasoned observers say they can't visualize cotton planters fighting for tight quotas on crop imports—a key plank of the conference, nor do they expect wheat growers to fight corn and cotton battles, or vice versa. Prime mover for the conference approach are the dairy producers, who see their high price supports in jeopardy.

Look for a test of strength in Congress. A clearcut victory for either side—or a compromise settlement—is unlikely. Thus, the prospect of a real brawl, a free-for-all scramble next year or in '59 by growers of each commodity to protect their own interests. That will end all hopes of reviving a united farm bloc.

•

Management may get some fresh ideas on farm policy as a result of hearings set for December by a House-Senate Economic Subcommittee, which has asked scores of farm experts to scan the troubled farm situation from all angles. The congressmen are after fresh approaches —testimony by farm-organization officials has been excluded on the grounds that they're already committed to fixed positions. University, other independent economists will take the play away from the professional lobbyists—at least for a few short days.

•

Free-trade lobbyists are tightening their bonds, too. With a foreign-trade policy fight looming next year, the recently formed Ameri-

Washington Newsletter

(Continued)

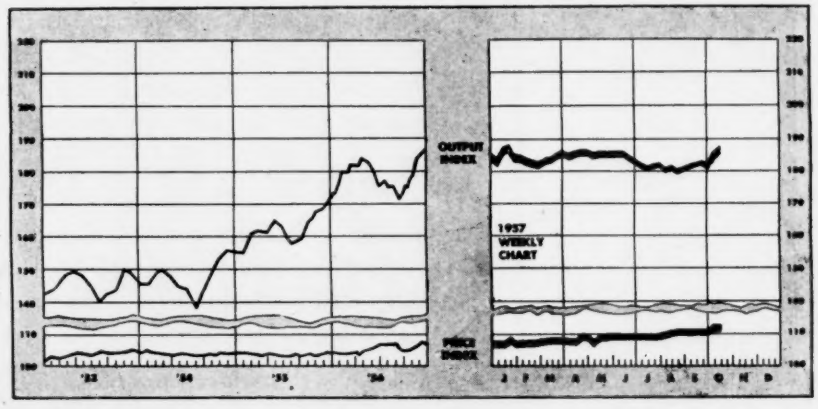
cans for OTC last week merged into the older committee for a national trade policy. Sidney A. Swensrud, former Gulf Oil board chairman, will head this committee's campaign for Congressional approval of U.S. membership in the Organization for Trade Cooperation and extension of the Trade Agreements Act—now slated to expire June 30—without restrictive amendments.

Chemical process industry executives named as directors of the beefed-up liberal trade group last week are I. Mark Bomba, vice-president of Schieffelin & Co., and Philip Cortney, president of Coty, Inc.

•

Are imported toys threatening America's small-fry? The Toy Guidance Council of New York says they are—and has written to health departments of 25 states and several big cities warning of excessive lead in paints on toys from Japan. The U.S. Public Health Service, Baltimore and New York City health departments and some big retailers are investigating the charges—with the New York agency slated to complete safety tests this week.

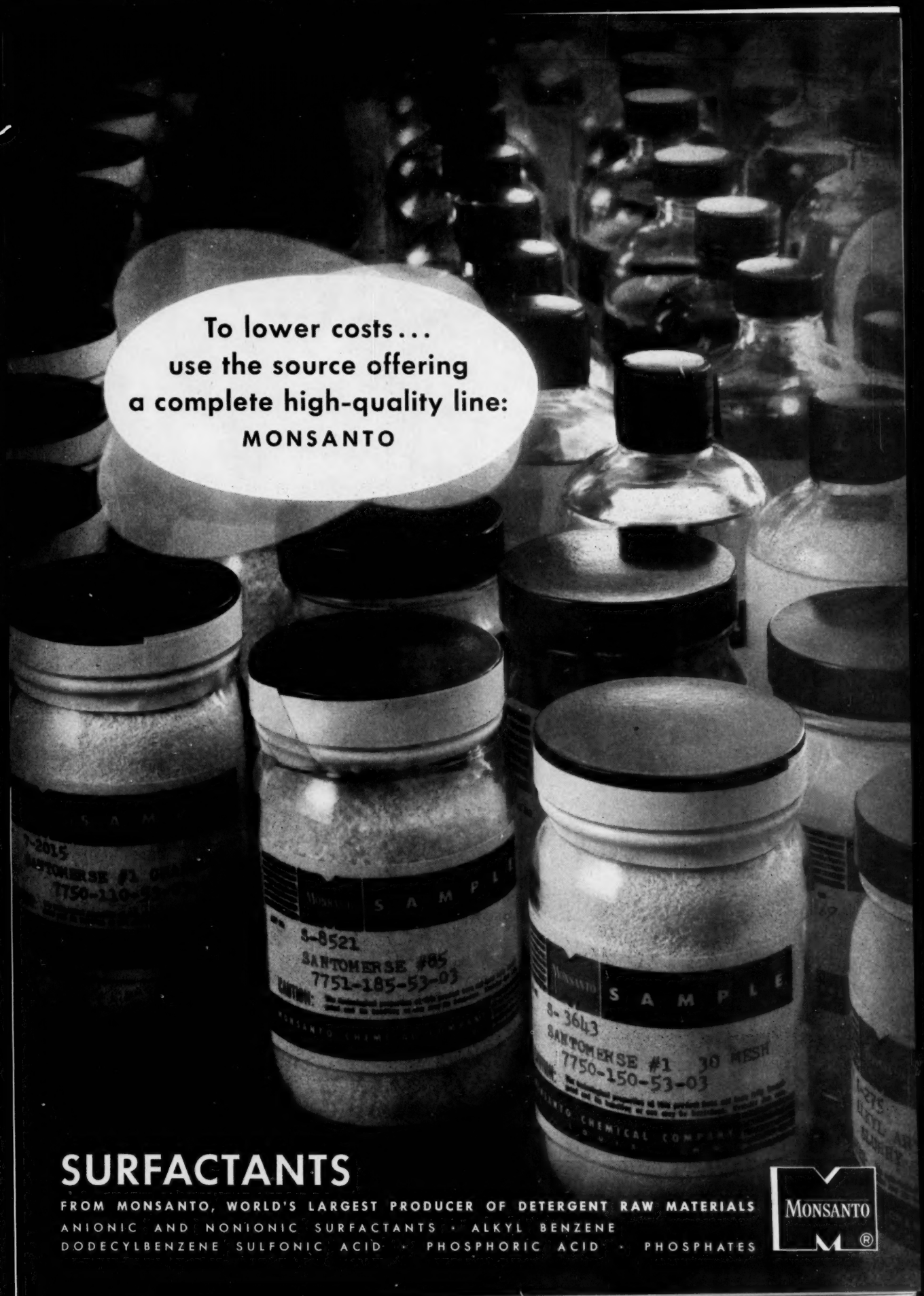
The toy council based its charge on one sample with a 22% lead content, found others had less than 1%. From Tokyo, Japanese officials have expressed astonishment, claim they're adhering to U.S. safety standards. And, in Washington, USPHS says its records have yet to show one case of permanent damage from nibbling leaded paints off toys.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	189.0	187.5	176.3
Chemical Week wholesale price index (1947=100)	111.0	111.0	105.5
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	41.08	40.75	44.91

MONTHLY Foreign Trade (million dollars)	Exports Latest Month	Exports Preceding Month	Exports Year Ago	Imports Latest Month	Imports Preceding Month	Imports Year Ago
Chemicals, total	115.1	112.5	103.4	20.8	21.4	19.1
Coal-tar products	9.1	6.1	6.8	5.7	5.0	5.7
Industrial chemicals	19.4	15.9	17.7	6.9	6.9	7.2



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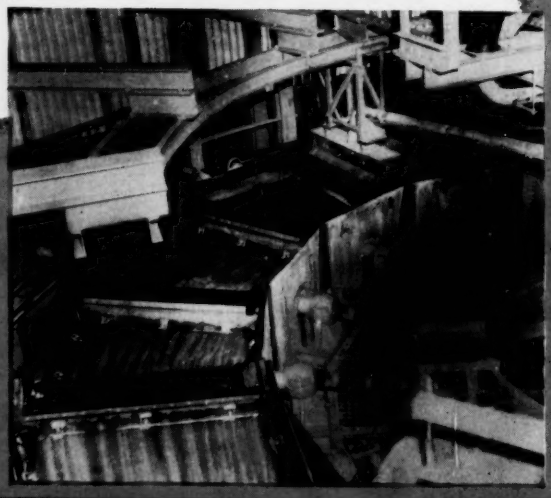
2. Must the solids be thoroughly washed with minimum quantities of wash liquor?	☐	☐
3. Must wash liquors be kept separate from mother liquor and from each other?	☐	☐
4. Is automatic cloth rinsing without product dilution necessary to avoid blinding of filter media?	☐	☐
5. Are the solids abrasive?	☐	☐
6. Is corrosion a problem?	☐	☐
7. Is a relatively large (100 to 500 sq. ft.) filtration area required?	☐	☐



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Merck's Hannoch, like personnel managers of companies in 43 states, finds that . . .

Hiring the Handicapped Makes New Sense

Like his fellow personnel managers all over the country, Julius Hannoch (above), of Merck's research division, takes technical job applicants where he finds them. And there are times when they can be pretty hard to find. The personnel man's technical-manpower problem, however, spells employment opportunity for thousands of physically handicapped people who can give a day's work for a day's pay.

This week, for example, Du Pont is poring over returns from its first intracompany survey of physically handicapped personnel. It's a survey intended to detail how the latter have fared in their jobs, and it could markedly affect the firm's hiring policies. There's little chance, however, that Du Pont's findings will be less than encouraging.

Still, the Du Pont survey points up a rising, industry-wide interest in hiring the handicapped, particularly in research, where the premium is on mental rather than on physical ability. Bolstering this trend is a combination of employer enlightenment and new legislation that takes some of the financial risk out of hiring the impaired.

Hannoch cites three questions that he asks in screening a handicapped person for a job or a promotion. Has he the qualifications? Will he be a hazard to himself? Will he be a hazard to his fellow employees? Yes to the first question, no to the second and third make the applicant a good risk. Merck has experienced little turnover (less than average) among its handicapped personnel, found most of them to be compatible with fellow employees and promotable to better jobs. And that's pretty much the experience of other firms, too.

The list of disabilities that have been overcome by

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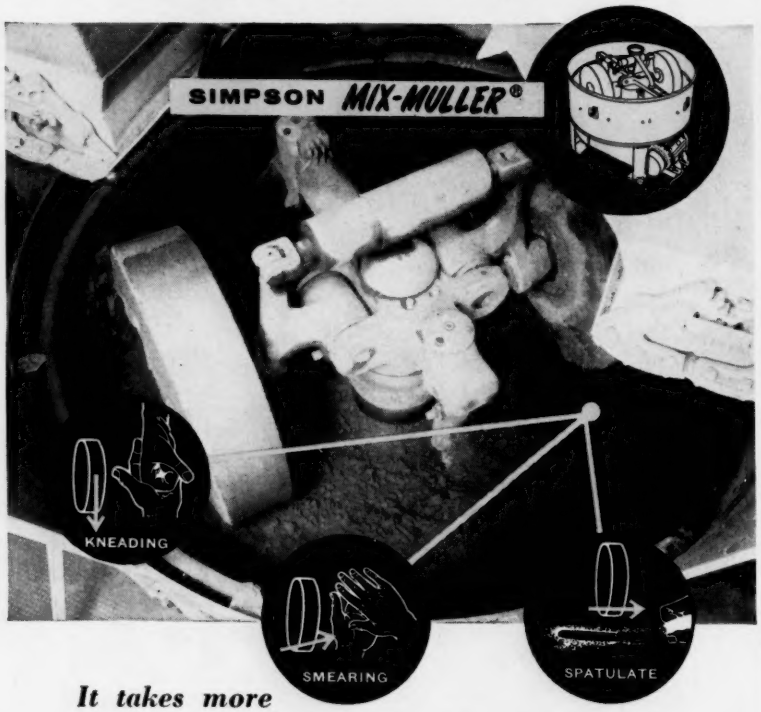

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researchers is impressive. At Wyeth Laboratories (Philadelphia), a cerebral palsy victim is a skilled analytical chemist. Polio victims hold down research spots at Dow's Western Research Division (Pittsburg, Calif.) and California Research Corp. (Richmond, Calif.). Also at Cal Research, a 35-year-old World War II multiple amputee has, in six years, worked himself up from bench chemist to middle research management.

Goodyear's research division (Akron, O.) has two amputees in management posts. One Union Carbide division boasts an associate director of development who is almost totally blind. He has the help of a reader, wants and gets no other special treatment.

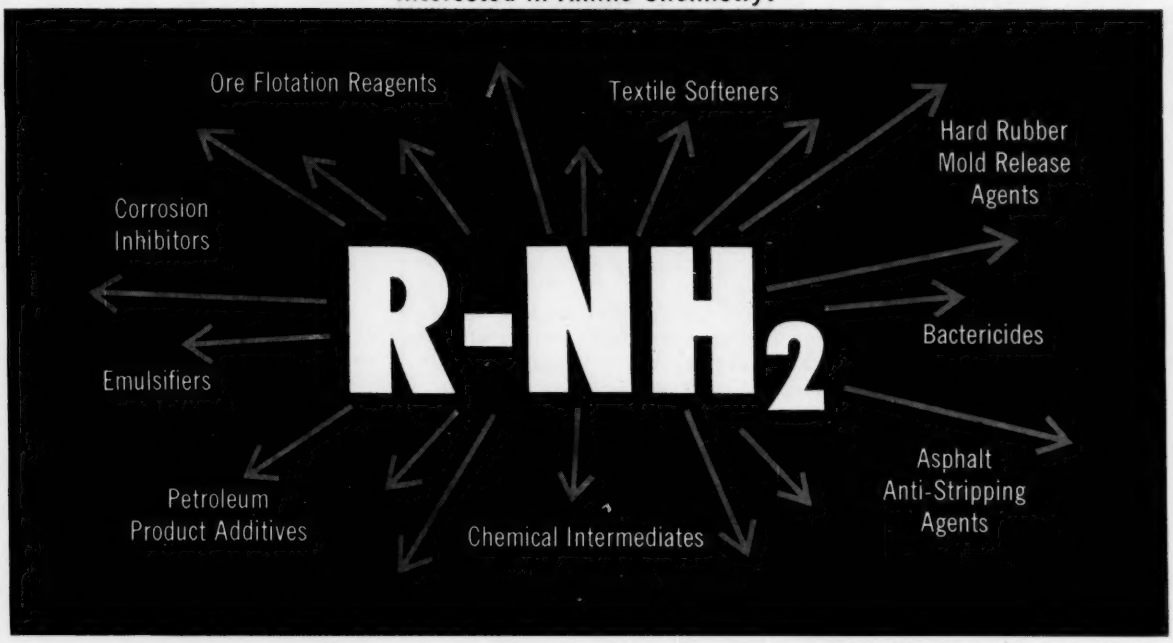
Assist from the Law: Underlying the changing attitude that firms have toward hiring the handicapped is "second-injury fund" legislation, which has been adopted, in one form or another, by 43 states. Arizona is the most recent to enact such a law (1956). Georgia, Louisiana, Nevada, New Mexico and Virginia are not yet on the bandwagon.

As defined by U. S. Dept. of Labor Bulletin 190, a second-injury fund is "a special fund set up within the administrative framework of the workmen's compensation system to insure that an employer who hires a handicapped worker will not, in the event such worker suffers a subsequent injury on the job, be responsible for a greater disability than actually occurred while the worker was in his employment."

The Labor Dept. reports favorable reaction to such legislation by employers and workers alike. Here's why: (1) it removes an important obstacle to the employment of handicapped persons; (2) it relieves employers of financial responsibility for disability incurred by an employee prior to employment; (3) the employee is assured of full compensation for his total disability (from the fund) if he suffers further injury.

For example, an employee with one eye could, in certain states, receive permanent total disability compensation from the fund if he lost the remaining eye while on the job. His employer would be responsible only for a much lesser sum to compensate for the loss of one eye.

Interested in Amine Chemistry?



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Primary laurylamine	Alamine 4	270 min.	2.0 max.
Primary palmitylamine	Alamine 6	207 min.	2.0 max.
Primary stearylamine	Alamine 7	186 min.	6 max.
Primary coco amine	Alamine 21	250 min.	16 max.
Primary tallow amine	Alamine 26	192 min.	35 min.
Primary hydrogenated tallow amine	Alamine H26	192 min.	6 max.
Primary cotton amine	Alamine 33	192 min.	65 min.
DISTILLED GRADE—97% Min. Primary Amine Content			
Primary laurylamine	Alamine 4D	294 min.	2.0 max.
Primary palmitylamine	Alamine 6D	225 min.	2.0 max.
Primary stearylamine	Alamine 7D	202 min.	6 max.
Primary coco amine	Alamine 21D	272 min.	16 max.
Primary tallow amine	Alamine 26D	207 min.	35 min.
Primary hydrogenated tallow amine	Alamine H26D	207 min.	6 max.
Primary cotton amine	Alamine 33D	207 min.	65 min.
MIXED AMINES 60% min. primary amine content	Alamine 46	150 min.	20 min.

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X **Paper Converters** use it as a hot melt and are enthusiastic about the low-cost quality coating it offers. Grease resistance, scuff resistance and single feed to automatic machines are other advantages!

X **Dairy Carton Coaters** add it to waxes for their cartons, getting longer shelf life and reducing flaking, leaking and bulging!

X **Food Packagers** like the smarter, glossier appearance of their packages—less rub-off and scuff. Printing looks better, too!

X **Box Makers** coat interior surfaces of corrugated cartons with an A-C POLYETHYLENE-Paraffin blend to eliminate the need for liners! Scratch from paper fibers on fine finishes is eliminated!

X **Textile Finishers** find A-C POLYETHYLENE surprisingly versatile for sizes or finishes. Excellent hand, sewability, durability, abrasion resistance and many production advantages result from using this polymer!

X **Ink and Paint Manufacturers** are satisfied that A-C POLYETHYLENE adds anti-smudge and scuff resistance characteristics to their products!

X **Slush Molders** use A-C POLYETHYLENE with other polyethylenes and end up with a "brand new" material, giving them simpler production with lowest mold costs. The finished articles are tough, colorful and have fine detail!

X **Film Extruders** are using A-C POLYETHYLENE for faster extrusion rates, lower machine temperatures, easier gauge control and less all around machine stress. A-C POLYETHYLENE is a natural for coloring films. Color concentrates made with A-C POLYETHYLENE produce brilliant, uniformly colored film!

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RESEARCH

Coverage by second-injury funds varies widely from state to state. It may be broad enough to protect workers with many types of prior disabilities—as, for example, polio, epilepsy, arthritis, heart disease or diabetes; or it may be so narrow that it applies only to such handicaps as the loss, or loss of use, of a hand, arm, foot, leg, or eye.

There are differences, too, in the way second-injury funds are financed. Relatively few states finance them wholly or partly by legislative appropriation. Most states require employers to underwrite the program as a group. Last fiscal year, more than $3 million was paid out by the top dozen funds to 2,500 workers in a dozen states.

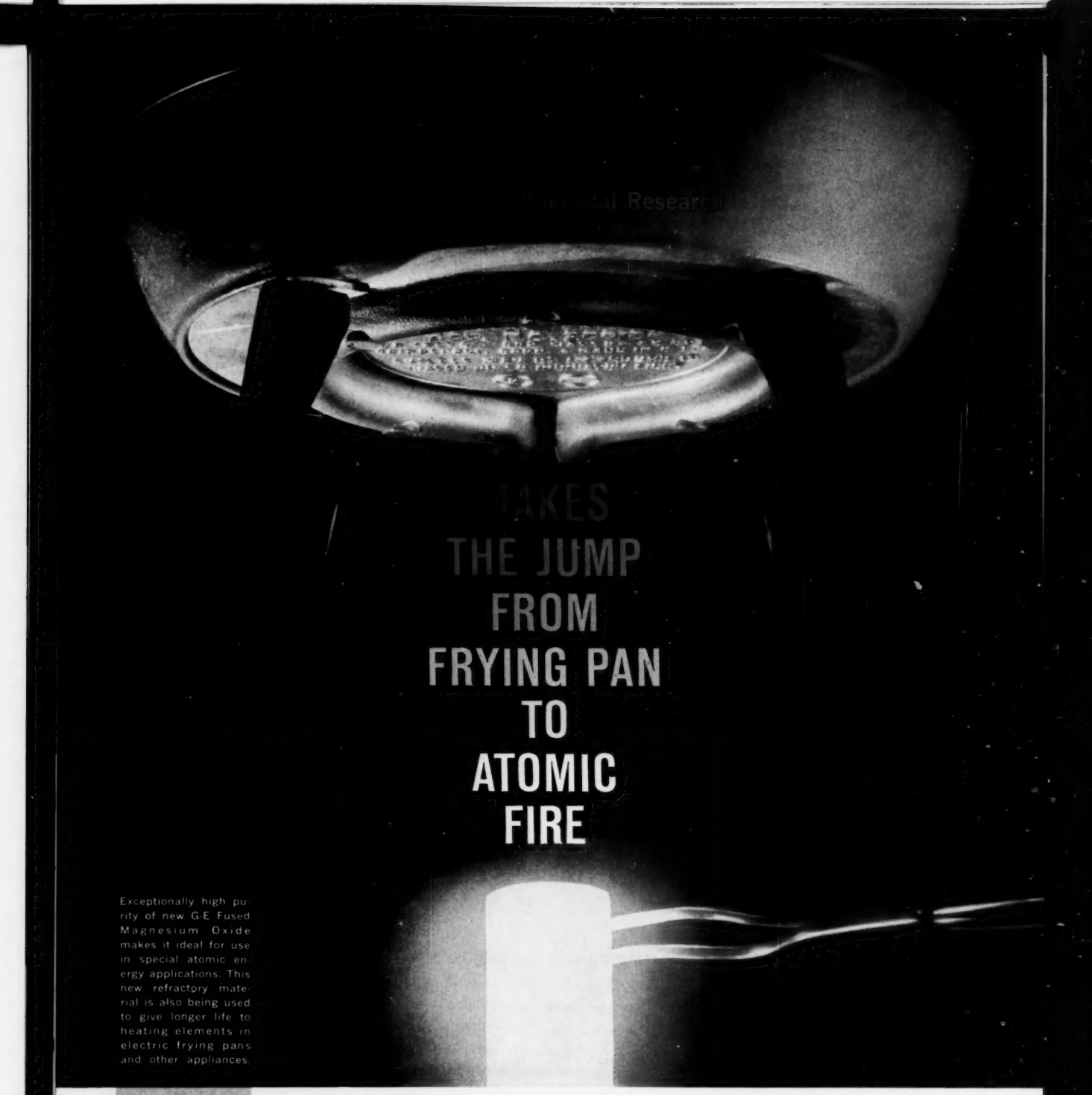
Other agencies, of course, are helping the handicapped find profitable employment—whether in research or other jobs. The federal-state vocational rehabilitation program during 1956 found positions for 56 handicapped chemists and 26 chemical engineers who had previously been unable to pursue their professions.

This program is conducted by the office of vocational rehabilitation, Dept. of Health, Education & Welfare, in cooperation with state vocational rehabilitation agencies. Last year, the federal agency made grants of $42 million, which accounted for two-thirds of the budgets of these state agencies. All told, the programs returned 72,000 persons to profitable employment last year.

Over the long term, the performance record of handicapped researchers has established their worth. As a matter of fact, the very term "handicapped" has fallen into some disrepute in research circles. G. Barr Co. (Chicago), Goodyear, Smith, Kline & French (Philadelphia), Foote Mineral Co. (Philadelphia) are typical of companies that report a "handicapped" person is not considered to be handicapped if he is fully qualified for his job.

Sums up one firm: "As long as their mind, spirit and initiative are available, the handicapped are best treated the same as everybody else. We're more interested in ability than disability."

For a look at how one handicapped researcher is faring in industry, turn to page 61.



TAKES THE JUMP FROM FRYING PAN TO ATOMIC FIRE

Exceptionally high purity of new G-E Fused Magnesium Oxide makes it ideal for use in special atomic energy applications. This new refractory material is also being used to give longer life to heating elements in electric frying pans and other appliances.

Another example of

CHEMICAL PROGRESS

In an atomic laboratory, a crucible containing fission materials is raised to white heat. To meet the special requirements of this work and other high-temperature refractory uses, G.E. is now offering a new, extremely high purity grade of fused magnesium oxide.

General Electric has conducted chemical research on fused magnesium oxide for many years. G-E Calrod® heating elements were the first to employ the material as a safe, efficient insulation for high temperature units.

An extensive development and testing program has yielded a new grade of fused magnesium oxide that is able to increase greatly the service life of heating elements in electric frying pans, ranges and other appliances. Today atomic applications can also benefit from this continuing research by General Electric.

Your own investigation of G.E.'s new grade of fused magnesium oxide may bear profitable fruit in still other ceramic, electrical or electronic applications.

For information on G.E.'s fused magnesium oxide products, write Dept. CMD, CHEMICAL AND METALLURGICAL DIVISION, General Electric Company, Pittsfield, Mass.

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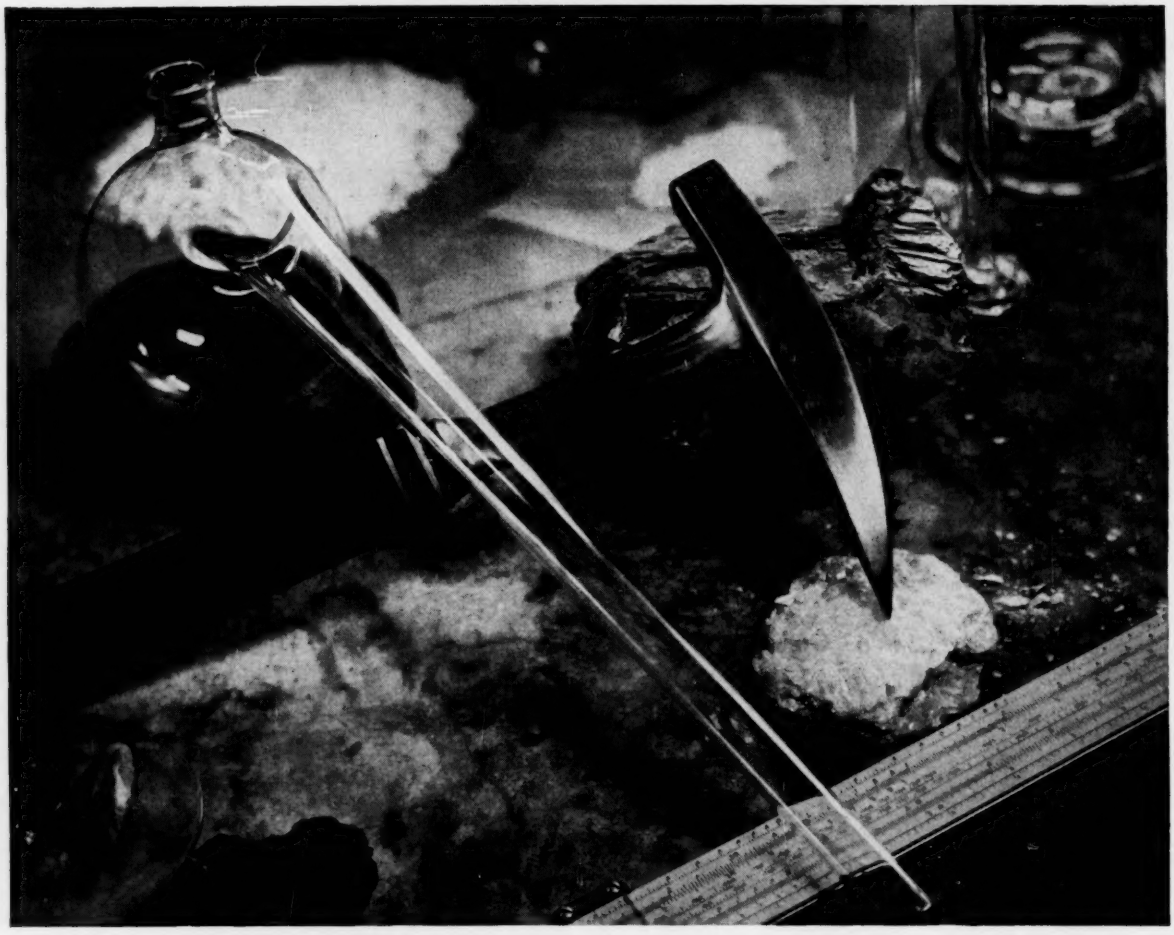

THE HAMMER AND THE RETORT

As the geologist's hammer signifies the mineral wealth locked in the earth's crust, the chemical retort signifies the power to free that wealth for the benefit of mankind. Together, the hammer and the retort symbolize the marriage of geology and chemistry that is the tradition and the future of the Foote Mineral Company.

Founded eighty years ago as a supplier of mineral products, Foote has expanded constantly, until now its business includes mining, mineral and alloy processing, chemicals, and metals. And the pioneering done by the company in the extraction and application of many lesser known elements has contributed substantially to many important technological advances.

Foote Mineral Co., 420 Eighteen West Chelten Bldg., Philadelphia 44, Pennsylvania.

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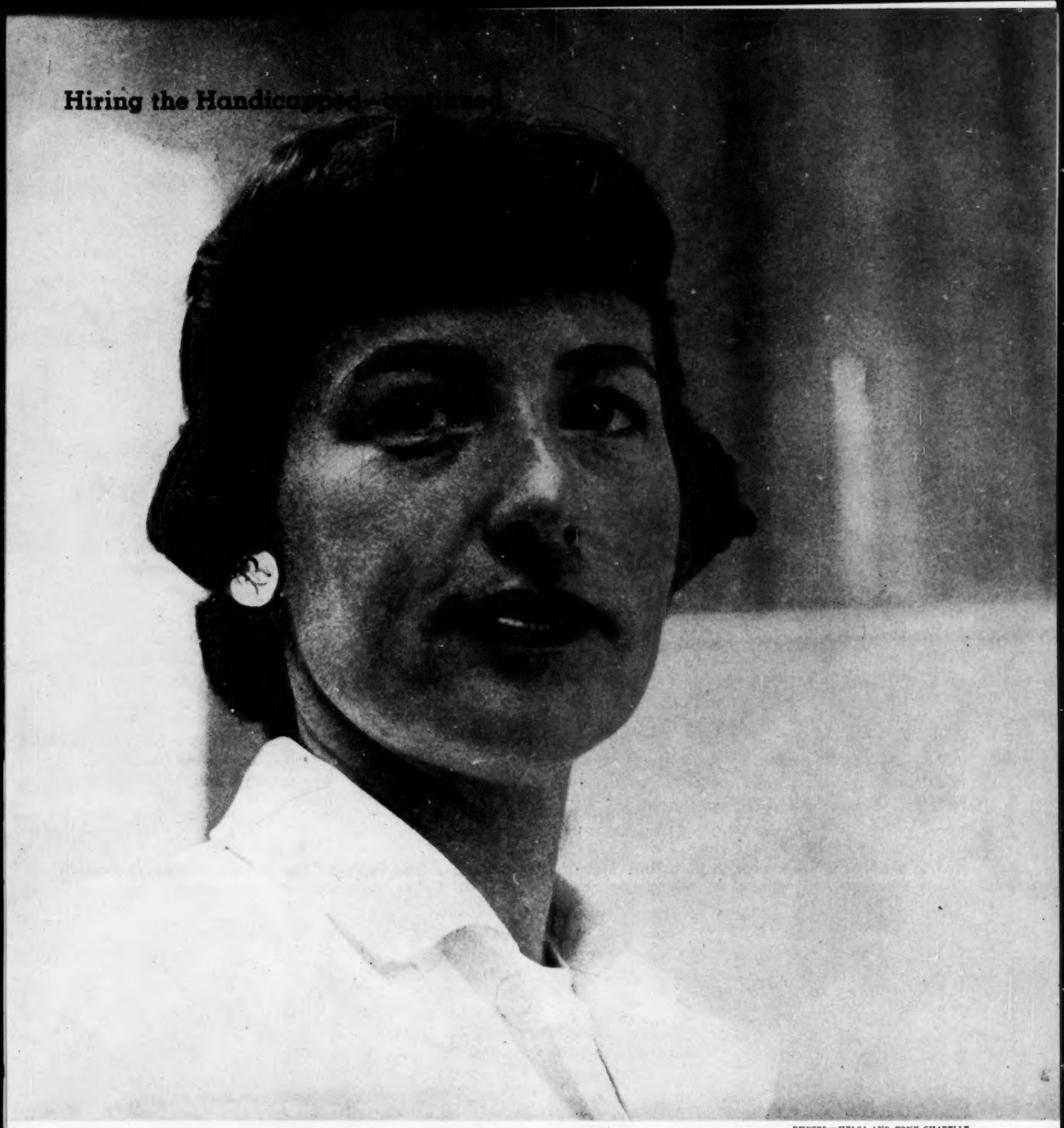


PHOTOS—HELGA AND TONY CHAPELLE

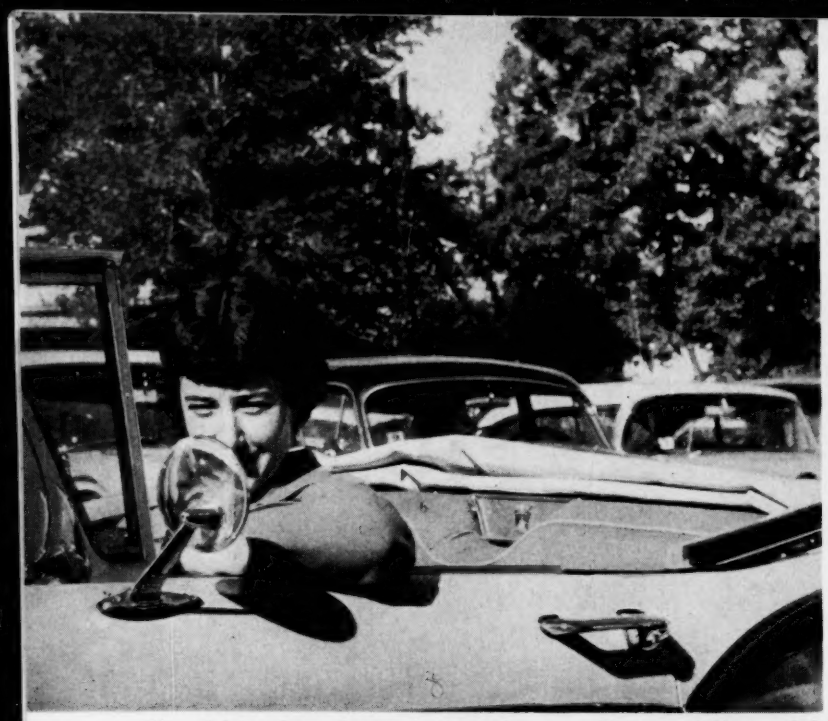
Intense concentration shapes features of deaf-mute Rita Walsh as she reads lips of fellow researcher.

Spunky Girl Faces Up to Her Silent World

Comely, auburn-haired Rita Walsh never hears the praise she draws so frequently for her work at the Merck Institute for Therapeutic Research (Rahway, N. J.). Deaf and nearly mute, Rita must read lips or memos in carrying out her daily tasks in the experimental pathology department.

Rita graduated from the College of St. Elizabeth in Convent Station, N. J., in 1950, with a B.S. in biology, joined Merck in Jan. '51. For the first four years, she worked in the poultry nutrition group (preparing experimental diets, etc.), was then transferred—at her own request—to her present post of histology technician.

The work is exacting, involves preparation of tissue sections for microscopic examination, includes cutting, staining and mounting tissue. Rita performs complicated staining techniques, displays a high degree of skill



Rita drives from home in East Orange, N.J., to Rahway lab, where change into white coat starts day.

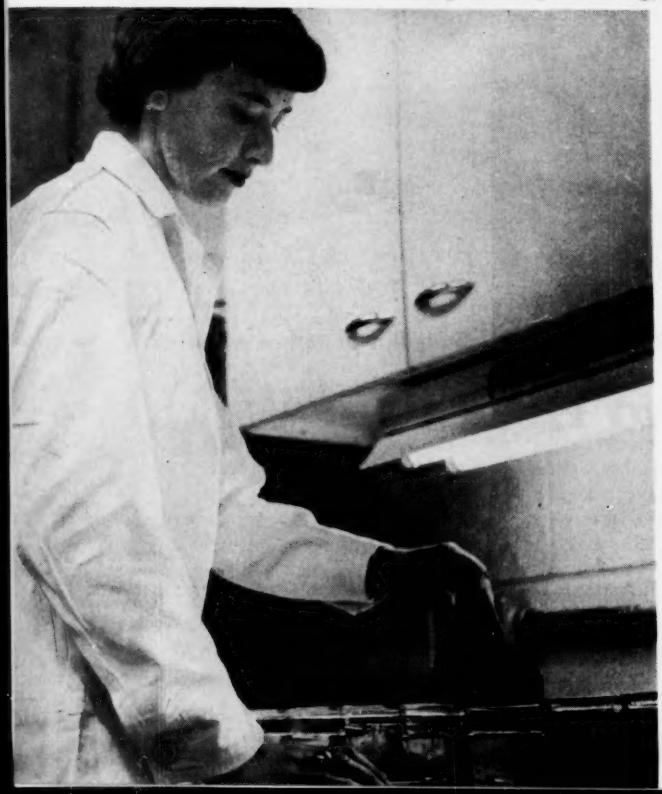
in bringing out the features the pathologist wants to see.

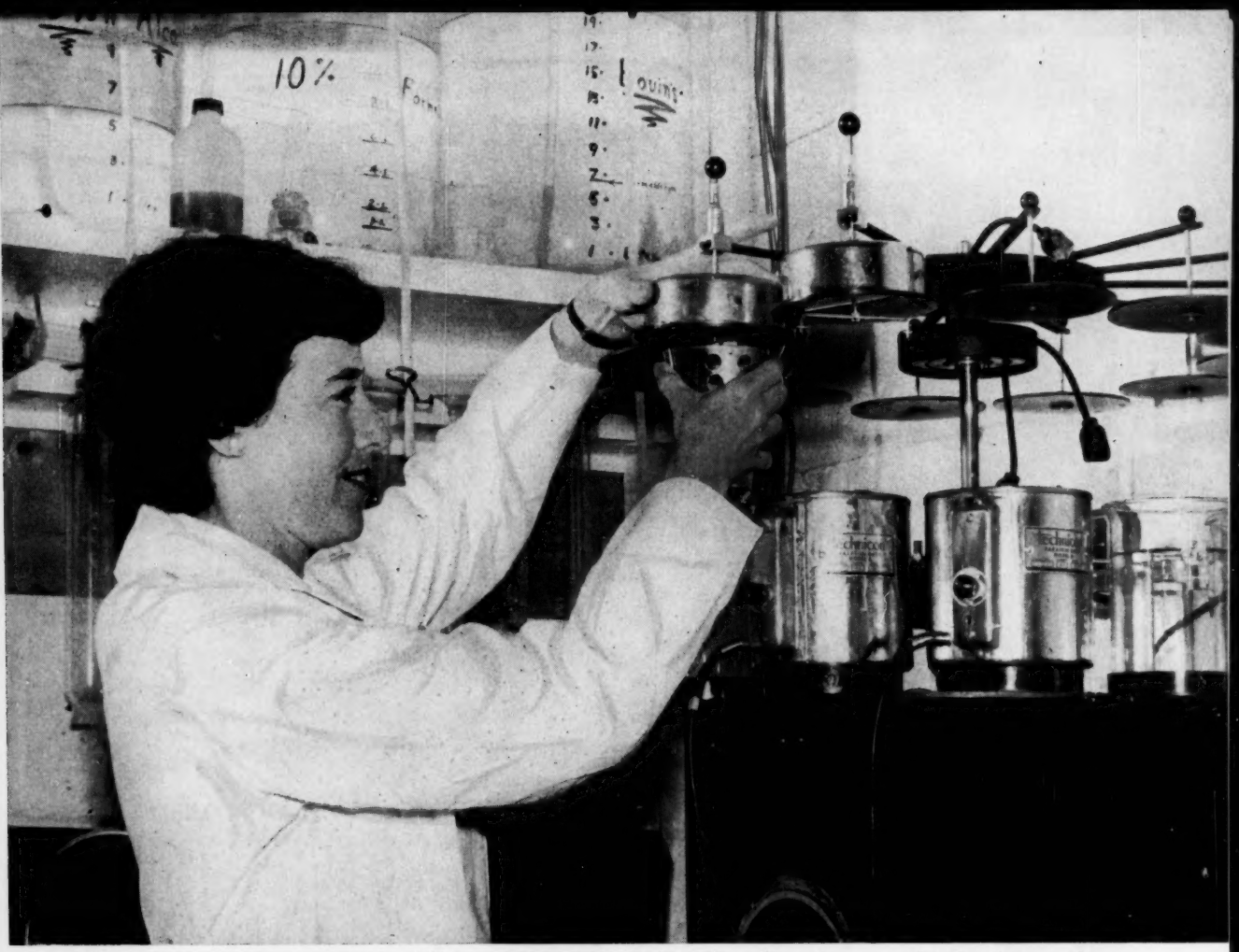
Her world, though perpetually silent, does not lack for friendship. Cheerful and companionable, she gets along well with her fellow technicians and other staffers of the Merck laboratories. And, although she can't hear, her alert eyes keep her from missing very much conversation during relaxed moments in the cafeteria or on the laboratory's campuslike grounds.

At lunch, or in the library, Rita may encounter similarly handicapped Mark Perry, an analytical chemist who has spent 13 years with the company. On these occasions, the "conversation" proceeds in a flurry of sign language. Perry has also done well at Merck. He is now an acknowledged authority on testing narcotics, attributes some of his success to freedom from distractions (such as jangling telephones).

So far, Rita's ambitions haven't been severely thwarted by her handicap. Thanks to her competence and her employer's understanding, they likely never will be.

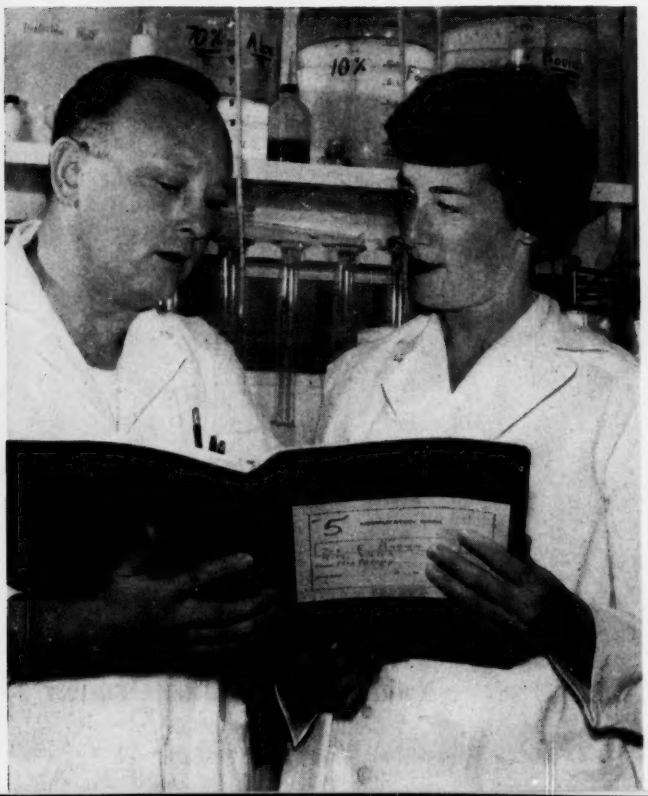
Work is delicate and exacting: cutting, staining, mounting tissue sections for use in microscopic study.

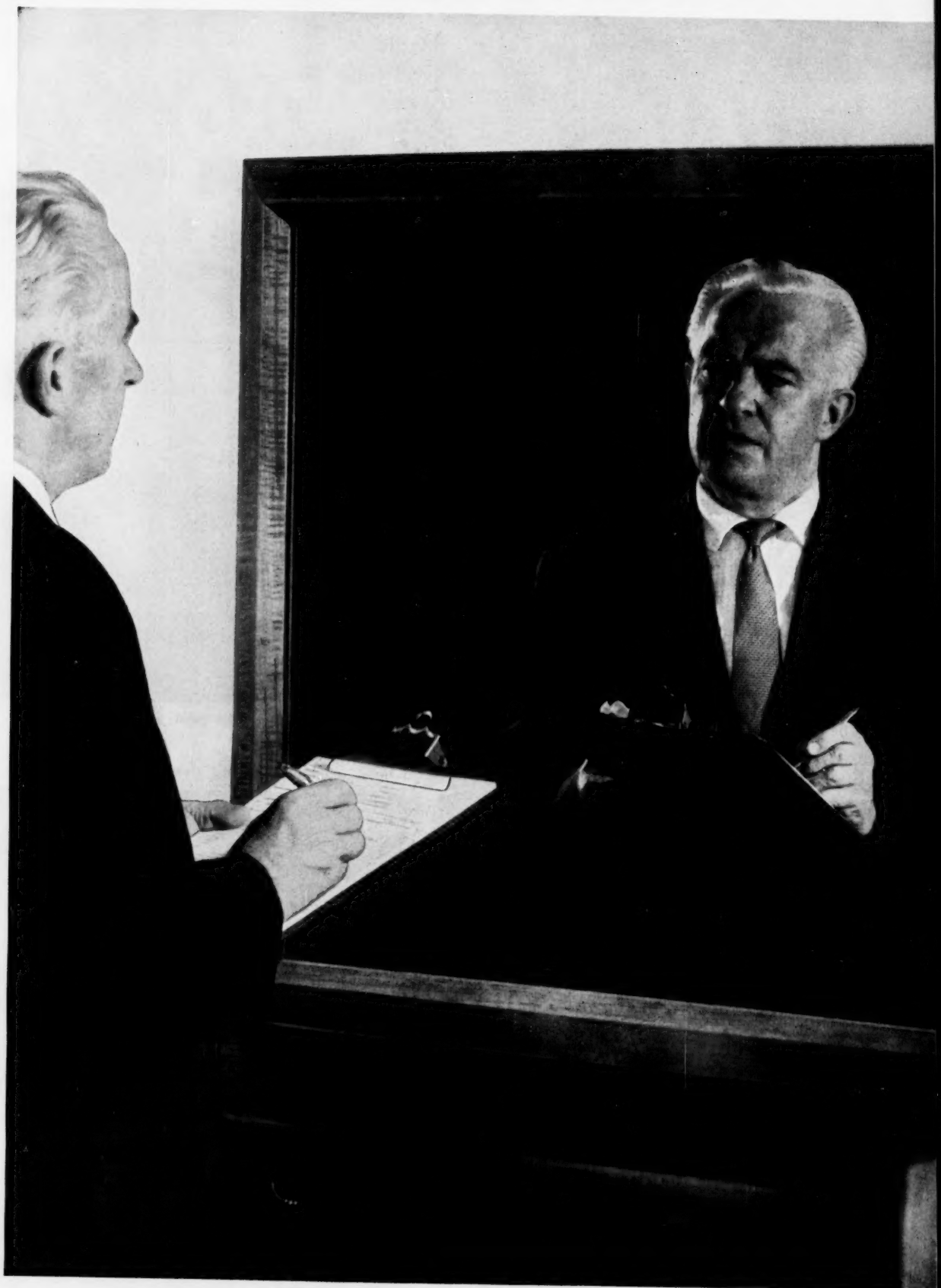




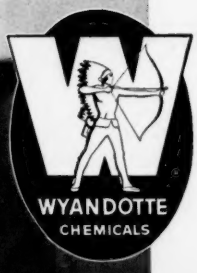
Inability to hear does not impair skill. A graduate biologist, Rita often draws praise for her work.

A companionable co-worker, she 'chats' easily with technicians Brown (left) and Greenwald (right).





ONE OF A SERIES



Why not a self-survey for chemical distributors?

Research is universally accepted as a valuable sales tool.

Most manufacturers use it to advantage. We do at Wyandotte.

We see no reason why every chemical distributor could not profit from it, too.

Start out by writing down the answers to these questions concerning *your own* business:

Are my policies in tune with the times? Am I doing a lot of things just because I've done them for the past 20, 15, 10, or even 5 years?

Are my own costs in line? Could I save more with fork-lift trucks or other new materials-handling equipment, data processing to control inventories and route deliveries?

Am I pushing *nationally known brands* (which help protect and identify me)? Or, am I selling *nonentities* (which help break down the price structure)?

Could I serve my customers better, and profit more, from a better understanding of my products? Should I have closer contacts with the makers? Do I need more data on their structure and uses?

Are the manufacturers I represent doing a good job of *selling their brands nationally* to the markets I serve? Are they keeping me informed on product information? . . . on distribution policies?

You, no doubt, will think of many more vital questions pertaining to your own business.

Following this procedure will certainly be helpful to you! It was to us.

As a result of our own searching questions, we have revised and revamped many of our distribution policies . . . arrived at a workable policy that meets modern marketing conditions. It is clear-cut and written down.

Wyandotte distributors have endorsed it.

Progress is being made.

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MICHIGAN ALKALI DIVISION

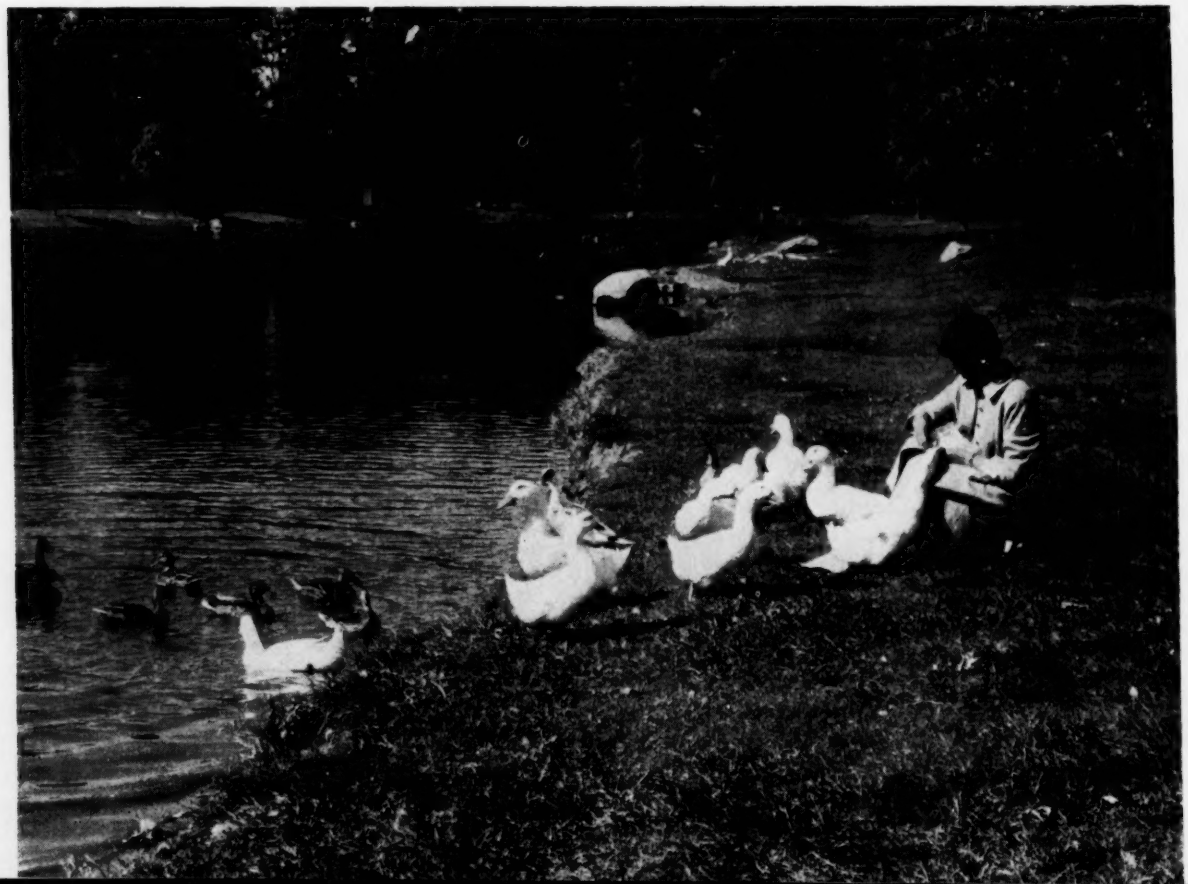
WYANDOTTE CHEMICALS CORPORATION, WYANDOTTE, MICHIGAN

Offices in Principal Cities

In a silent world, eyes must do the work of ears. Alert and highly expressive, Rita's eyes receive meaning, convey feelings in casual conversation over coffee in company cafeteria, as in the lab.

Cafeteria chit-chat . . . and a moment for reflection

Feeding waterfowl by lake provides a tranquil lunchtime moment in the midst of a busy schedule.



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It's true: National Aniline was the first producer of Phthalic Anhydride in substantial commercial volume.

Today we continue to set a high standard for the industry!

In color particularly, National® Phthalic Anhydride is excellent. It is pure white in flake form and clear when molten. Having high heat stability, it holds its clarity during processing. These quality features of National Phthalic Anhydride are especially valuable in light-colored resins and plasticizers.

And because we make a wide range of resin-chemicals, we are well equipped to serve your complete needs for Phthalic Anhydride and many other chemicals as well. For samples, quotations and other information, call or write our nearest office.

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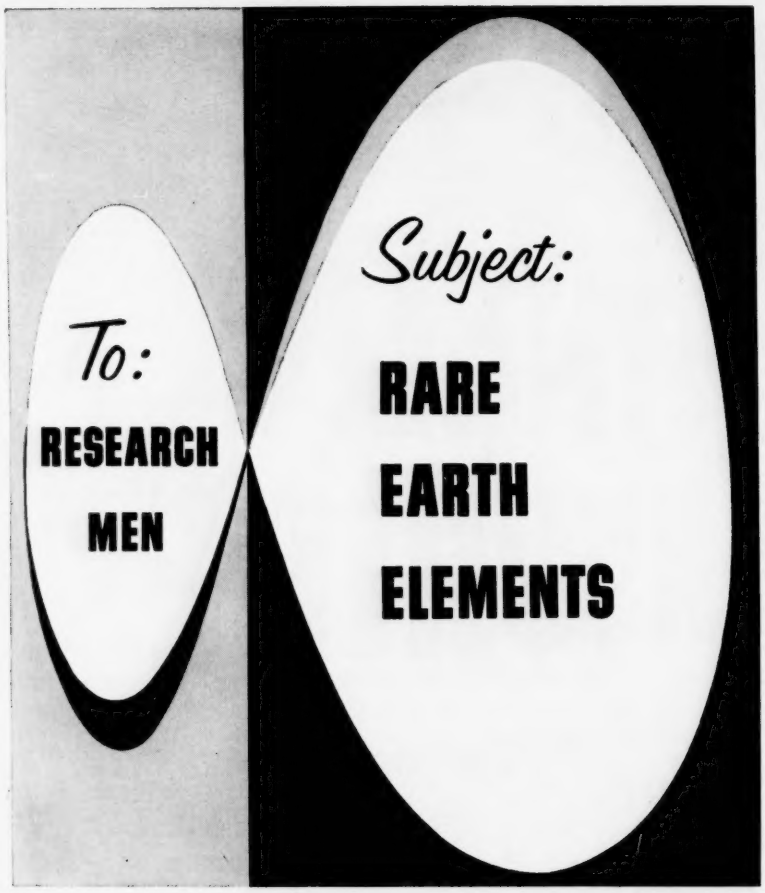

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WHOEVER AND WHEREVER YOU ARE, you are approaching completion of a special program. Your project involves one or more "heavy" rare earths in reactor technology, special weapons, electronics, alloys or cermets. By now you've passed the breakthrough point — you're ready to move from the pilot stage to full-scale production.

Michigan Chemical Corporation is ready to supply you with production quantities of the "heavy" rare earths you need. You can specify oxides or salts, even certain metals. Prices are reasonable and purities are warranted to 99.9%.

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RESEARCH

EXPANSION

• Standard Oil Co. of California's (Los Angeles) subsidiary, California Research Corp., is building a new laboratory at La Habra, Calif., for process and geological research.

• Eberhard Faber Pencil Co. (Wilkes-Barre, Pa.) has established new laboratories for product design and research in specialized writing instruments (e.g., for laboratory glass and plastic equipment marking).

• Stanford Research Institute (Menlo Park, Calif.) is readying a $500,000 metallurgical laboratory that will be the largest of its kind west of the Mississippi River. All of the lab's equipment will be installed by next Jan. 1.

• The U.S. Dept. of Agriculture's fruit-fly laboratory in Honolulu, Hawaii, has installed a 400-curie, cobalt-60 source that provides about 60,000 roentgens/hour of ionizing radiation. Purpose: to determine whether the rays eliminate or render harmless fruit-fly infestations of fruits or vegetables. If successful, the radiation will provide practical quarantine treatment.

• Shell Development Co.'s (Emeryville, Calif.) development division has been reorganized to segregate oil and chemical process development and to simplify liaison with Shell Oil Co. and Shell Chemical Corp.

REPORTS

The following new reports are available from the Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.:

• Forty-one atomic energy reports cover such chemical subjects as: primary shield materials study (CERD-SIC-106, 28 pages, 35¢); an extraction method for determining radioruthenium in organic samples (HW-48736, 13 pages, 20¢); conversion chemistry of plutonium nitrate (HW-49597A, 25 pages, 25¢); determination of uranium in irradiated thorium (IDO-14-411, eight pages, 15¢); extraction of chromium with trioctylphosphine oxide (ORNL-2326, 40 pages, 30¢); preparation of high-purity calcium oxide (LA-1936, 39 pages, 30¢); determination of lithium-6 by fission counting (K-1042, eight pages, 25¢); bibliography of syntheses with carbon isotopes (UCLA-395, 170 pages, $1); and determination of radiocesium by com-

News from
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Division of Union Carbide Corporation · 30 East 42nd Street, New York 17, N. Y.
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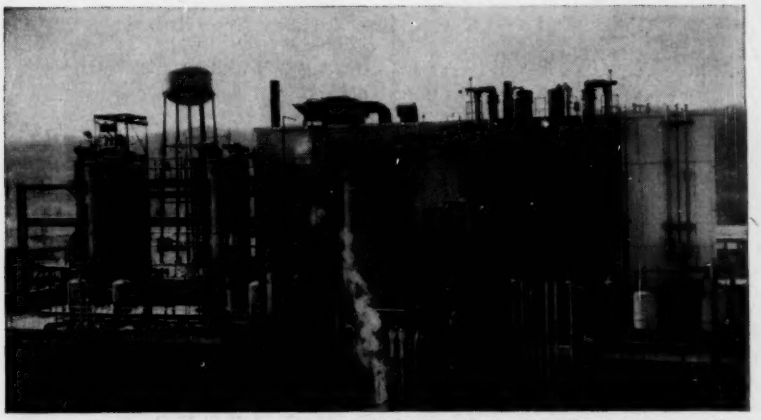
"KARBATE" IMPERVIOUS GRAPHITE SHELL AND TUBE HEAT EXCHANGERS PROVE THEIR ECONOMY IN COOLING CORROSIVE GASES

Gas coolers of "Karbate" Impervious Graphite cost less and last longer than coolers made of less corrosion-resistant materials.



Ten "Karbate" Impervious Graphite Shell And Tube Heat Exchangers cooling and condensing mixtures of organic vapors and hydrogen chloride. Units are arranged in pairs—uninsulated unit in each pair has plant cooling water on shell side; insulated unit is refrigerated.

These standard "Karbate" heat exchangers have 685-⅞" I. D. "Karbate" tubes assembled between "Karbate" tube sheets in 45" diameter steel shells. Corrosive water-saturated sulfur dioxide gas, which contains considerable entrained sulfuric acid, will enter and leave tube sides through 24" diameter connections on "Haveg" phenolic resin covers.

National Carbon provides complete Technical Service—An experienced technical staff designs and rates "Karbate" Shell and Tube Heat Exchangers manufactured and guaranteed by National Carbon. Dr. D. Q. Kern, well-known consultant and author of PROCESS HEAT TRANSFER, serves as an advisor to this group.

Particularly significant today is the economical cooling of corrosive gases. "Karbate" Impervious Graphite Heat Exchangers have the corrosion resistance, high thermal conductivity, immunity to thermal shock, and moderate cost vital to this service.

For cooling corrosive gases, "Karbate" Exchangers operate either horizontally or vertically, usually with the corrosive gas inside the "Karbate" tubes and with the coolant in the steel shell. These exchangers are furnished with shells of "Haveg" phenolic resin, impervious graphite, rubber or glass-lined steel for operation with corrosive gas on the outside of the "Karbate" tubes.

A complete line of "Karbate" Heat Exchangers is available in sixteen shell sizes from 6" I.D. to 45" I.D. with tube lengths of 6', 9', 12', 14', and 16'. Standard components are carried in stock for immediate assembly of units having up to 3585 sq. ft. of heat transfer surface.

For full details, request **Catalog Section S-6800NL**

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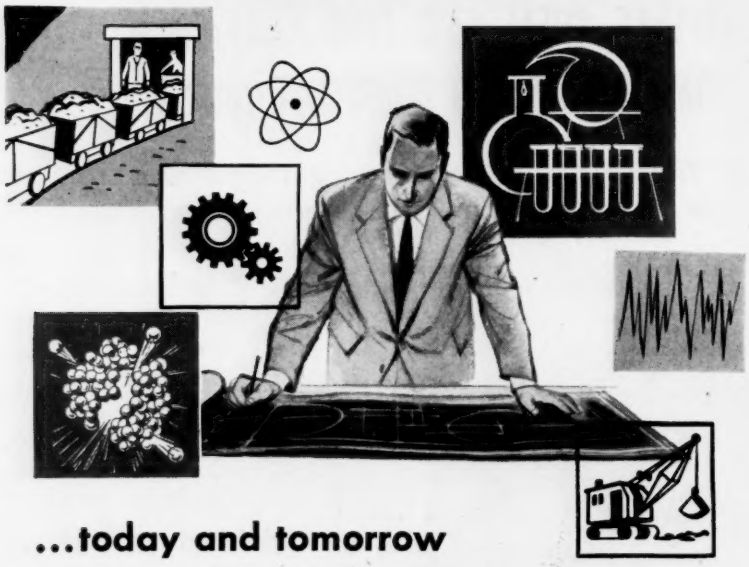
The terms "National", "N" and Shield Device, "Karbate" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

UNION CARBIDE

Vitro

IN ATOMIC ENERGY



...today and tomorrow

VITRO has an integrated range of activities in atomic energy, from the chemist's test tube and the miner's pick through the design and construction of complete nuclear facilities.

Some of the Vitro divisions and their roles in the nuclear industry:

VITRO LABORATORIES—chemical and physical research, and the development of processes, instruments and equipment systems.

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VITRO MINERALS CORPORATION—exploration and mining of uranium properties; largest producer in Wyoming.

VITRO URANIUM COMPANY—processing of ores to produce uranium salts for the AEC; management of uranium mining operations.

VITRO RARE METALS COMPANY—processing of uranium-bearing ores and residues; refining and recovery of rare metals, metallic salts and fine chemicals.

HEAVY MINERALS COMPANY—mining of source materials for thorium, titanium, zirconium and rare earths; processing thorium and its compounds, rare earth chemicals and related products.

In addition, Vitro has other operations in numerous promising areas of industrial technology.

Vitro

CORPORATION of AMERICA

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Research, development, weapons systems
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Thorium, rare earths, and heavy minerals
Recovery of rare metals and fine chemicals
Aircraft components and ordnance systems
Ceramic colors, pigments, and chemicals

RESEARCH

plex cobalticyanide precipitation (HW-49668, 32 pages, 30¢).

• "Research on Elevated Temperature-Resistant Inorganic Polymer Structural Adhesives" (PB 121908, 30 pages, 75¢) discusses the concept of inorganic materials (other than ceramics) for use as metal-to-metal adhesives. It describes development of an adhesive (made by reacting ammeline and phosphorous pentoxide), which has a shear strength of 285 psi. at 800 F.

• AEC has released translations of nine monographs of Russian technical research. (Among them: "Theoretical Principles of Isotope Methods for Investigating Chemical Reactions" (AEC-tr-2873, 456 pages, $2.20); and "Second All-Union Conference on Photosynthesis" (AEC-tr-2872, 122 pages, 60¢), which summarizes papers held at that symposium in Jan. '57. The papers cover photochemistry and spectroscopy of chlorophyl and other pigments, structure chemistry and biochemistry of chloroplasts, and bacterial photosynthesis.

• AEC Research Reports Price List No. 28 (free) is a new cumulative listing of more than 4,500 AEC unclassified reports. This price list is issued semiannually; the next edition will be available in Feb. '58.

APPARATUS

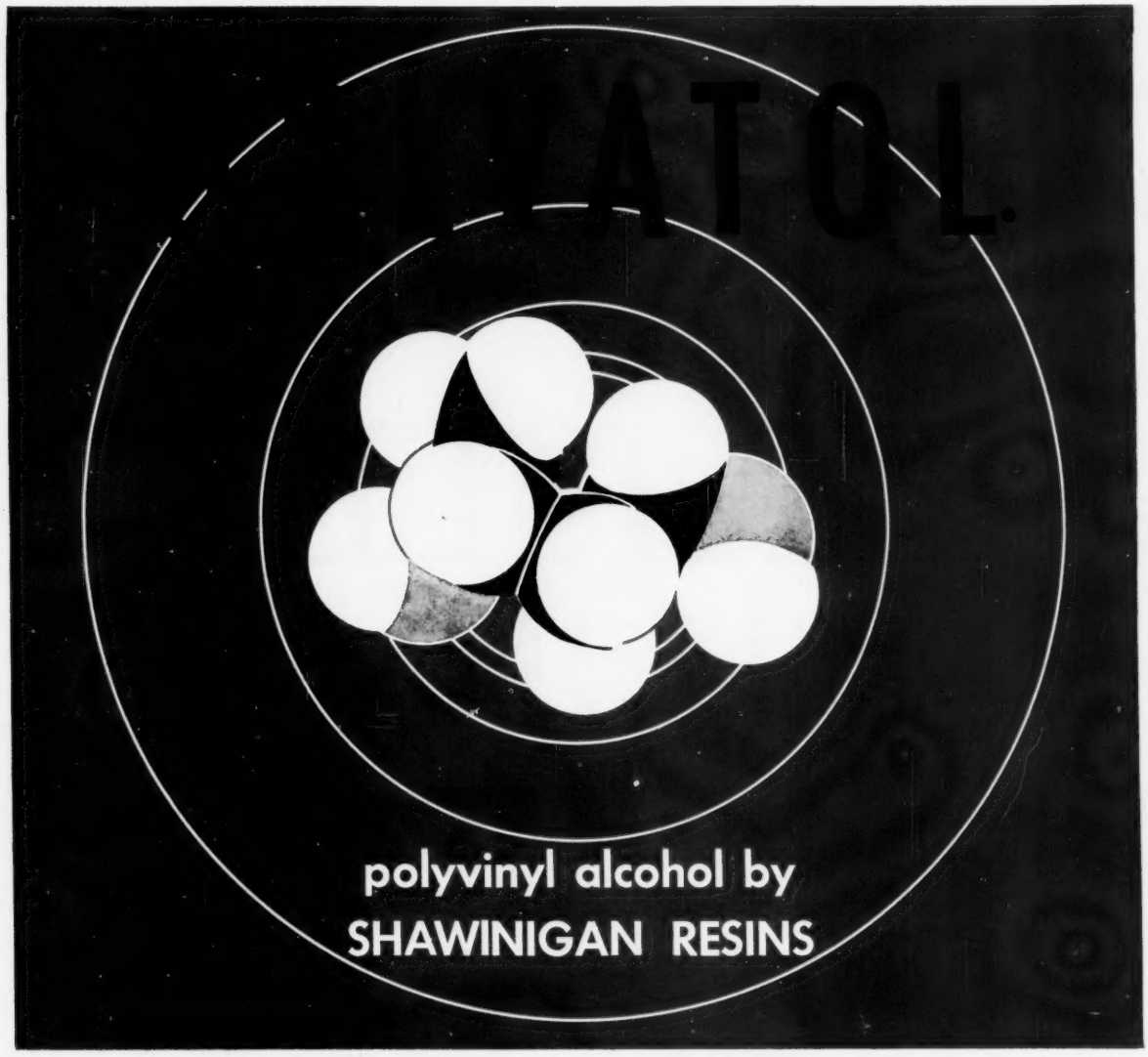
Decontaminator: Designed to eliminate contaminating oil vapor and impurities from ultrahigh-vacuum systems, the Copper Foil Trap, Type TFG-51, is now available from Consolidated Electrodynamics Corp. (Pasadena, Calif.). The trap will operate a full month before it must be purged.

•

Gas Purifier: The first fully automatic gas purifier and dryer, said to be capable of operating indefinitely without attention, is available from the Instrument Division of Baker & Co. (East Newark, N.J.). Named the Deoxo Dual Puridryer DMS, it can be used with nitrogen, hydrogen, helium, argon, carbon dioxide and saturated hydrocarbons, handles 100 cu. ft./hour.

•

Hi-Temperature X-ray Camera: Battelle Research Institute (Columbus, O.) has developed a high-temperature X-ray diffraction camera capable of studying materials at temperatures up to 2000 C.



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At a time when this broadly useful intermediate and raw material is often in short supply, your records should show that Stauffer has huge and growing facilities for the manufacture of Methylene Chloride.

The Stauffer plant at Louisville supplies Methylene Chloride in drums of 600 pounds net capacity . . . in tank trucks . . . in tank cars of 4000, 8000 and 10,000 gallons . . . and in barges. Drum shipments are also made from warehouse stocks at Chicago, Houston, Akron, Cleveland, Pittsburgh, Boston, San Francisco, Los Angeles, Portland, Ore., and Niagara Falls.

Stauffer Methylene Chloride meets the highest standards of purity.

Stauffer can also supply you with Carbon Bisulfide, Perchlorethylene, Trichlorethylene, Carbon Tetrachloride and Chloroform. A new brochure on Stauffer Chlorinated Solvents will shortly be ready for mailing. Kindly advise on your letterhead if you would care to have a copy.

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Stauffer CHEMICALS SINCE 1885

On mighty Mississippi, midway between Gulf and Great Lakes, barges are nudged toward Memphis.

Where Chemicals Vie for Cotton's Throne

Chemicals are by far the largest and fastest-growing manufacturing industry in Tennessee—leader among Southern states in chemical industry employment; and within Tennessee, the pace-setting community is Memphis. Evidence of chemical expansion in this hub city (metropolitan-area population approaching 500,000) of Shelby County was not hard to find this week.

Du Pont is adding a chlorine and metallic sodium plant to its already sizable works a few miles north of the city; and three smaller Memphis-based operations—Buckman Laboratories, Chapman Chemical, and Humko Co.—are carrying out what they call continuous expansion programs.

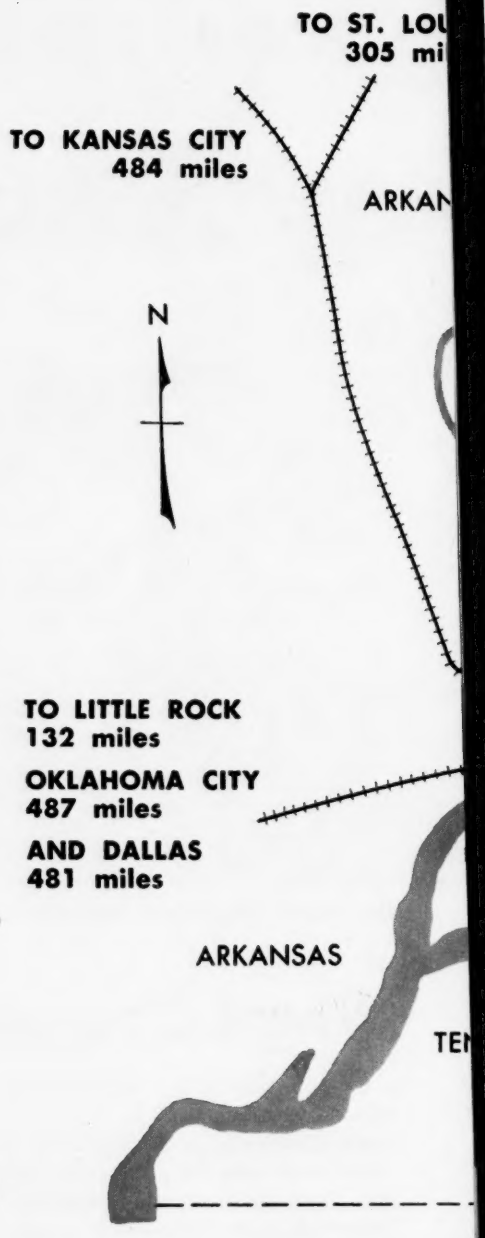
Shelby County's present chemical industry spurt dates back to 1952, when Du Pont built its peroxide and cyanides plant near Woodstock. Next big jump was in '54, when Grace Chemical set up its $20-million nitrogen plant, also near Woodstock. Both of those two concerns are in a good way for future expansion: Grace has 275 acres and Du Pont, 250—and in each case, less than one-fifth of the land is now in use.

Midway on 'Main Stem': Markets, raw materials and transportation facilities are the big drawing cards

East of Memphis, new $10-million switching yards.

MAJOR PRODUCERS AT MEMPHIS

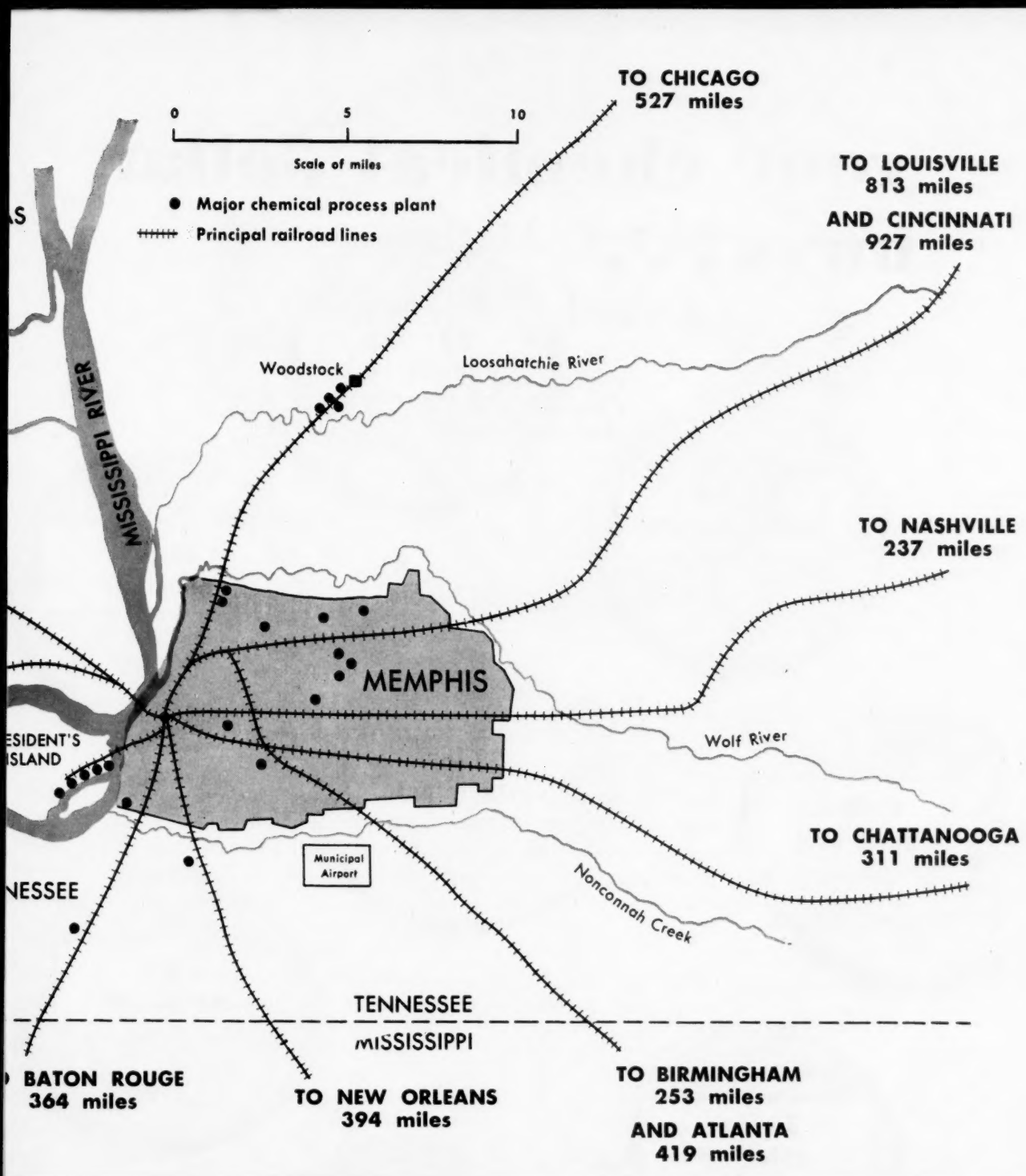
Company	Principal products
Near Woodstock:	
Cardox Corp.	Carbon dioxide, liquid and solidified
E. I. du Pont de Nemours & Co.	Hydrogen peroxide, sodium cyanide, potassium cyanide, hydrogen cyanide
W. R. Grace & Co.	Anhydrous ammonia, nitrogen fertilizer solution, urea fertilizer compound, feed-grade urea
Montana Ferroalloys	Ferrochrome, ferrosilicon
In Memphis:	
E. L. Bruce & Co.	Insecticides, floor waxes, floor cleaners, floor finishes
Buckeye Cotton Oil Co., subsidiary of Procter & Gamble Co.	Cotton-seed oil and by-products
Buckman Laboratories, Inc.	Products for industrial control of microorganisms
Delta Refining Co.	Petroleum refining
Forest Products Chemical Co.	Hardwood charcoal, acetic acid, methanol, hardwood tar pitches and oils
Humko Co.	Industrial fatty acids
Plough, Inc.	Drugs, pharmaceuticals, cosmetics, household chemical items
Quaker Oats Co.	Fertilizer conditioner, furfural
Swift & Co.	Fertilizers
Velsicol Corp.	Chlorine, caustic soda, sodium hypochlorite solution, heptachlor
Virginia-Carolina Chemical Co.	Fertilizer, insecticides, pesticides, sulfuric acid
Wesson Oil & Snowdrift Co.	Vegetable oil refining, cottonseed oil and by-products
On President's Island:	
Cargill, Inc.	Soybean oil
Mid-South Chemical Corp.	Fertilizers
South of Memphis:	
Chapman Chemical Co.	Wood preservatives, insecticides, weed killers, defoliants, industrial chemicals
Armour Fertilizer Works	Dry-mix fertilizers



at Memphis. As a big rail center (*map, above*) on the "main stem" of the nation's inland waterways system and roughly midway between upstream industrial centers (like Cincinnati and St. Louis) and downstream cities (such as Baton Rouge and New Orleans), Memphis is a natural "trading post" in interregional commerce.

The Mississippi and a large westerly flowing underground stream provide plenty of process water. Raw materials produced within 100 miles include cotton and cottonseed, soybeans, hardwoods, bauxite, chemical lime, clays, fuller's earth, perlite and sand. Four pipelines bring in natural gas from Louisiana and Texas; and electric power is available at rates running to less than 50% of those in effect at Detroit and certain other large cities. Electricity is now generated by Tennessee Valley Authority, will later be supplied from the city's own $121-million steam power plant, reportedly the largest single power project ever undertaken by a municipality.

Principal markets in the region are the growing manufacturing industries



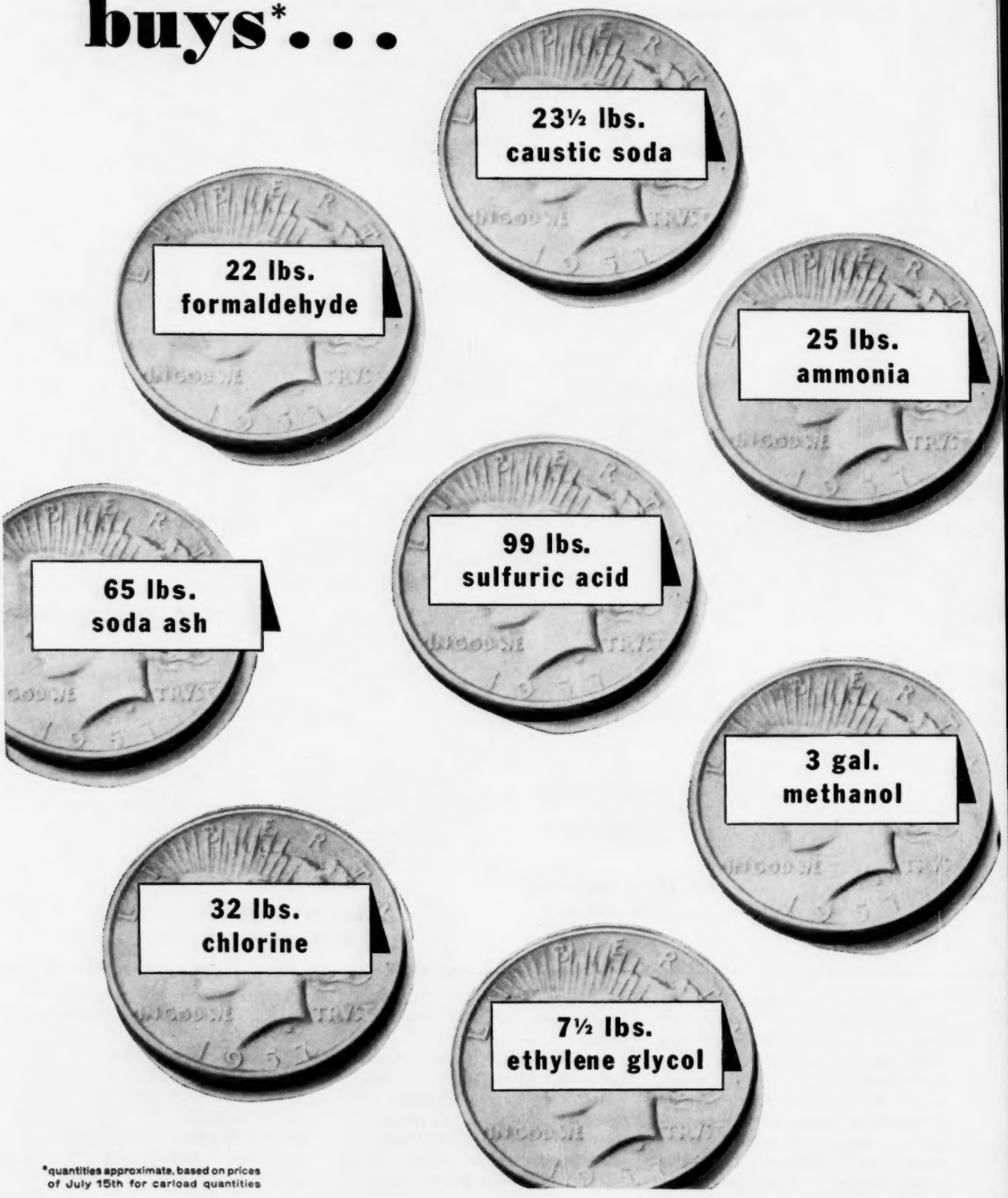
of the lower Mississippi Valley, the bountiful crops and livestock agriculture of Tennessee and adjoining states, and the more than 10-million consumer population of the seven-state area.

Medley of Factors: Reasons why existing chemical process plants are located in Memphis and Shelby County hinge on a combination of those general factors. The shipping facilities are usually the common denominator.

For one of the oldest and one of the newest plants here, management cites "close to raw materials" and "good transportation" as primary attractions. Southern Cotton Oil Co.—recently acquired by Wesson Oil & Snowdrift Co.—has been operating in Memphis since 1888. Cargill's chemical plant went into operation only six months ago.

Similarly, Humko came to Memphis in 1949 to be close to a source of by-products from edible-oil refining; Forest Products Chemical Co. came in 1911 for the raw hardwood; and Cardox came in the wake of the W. R. Grace venture, which supplies by

your chemical dollar buys*...



*quantities approximate, based on prices of July 15th for carload quantities

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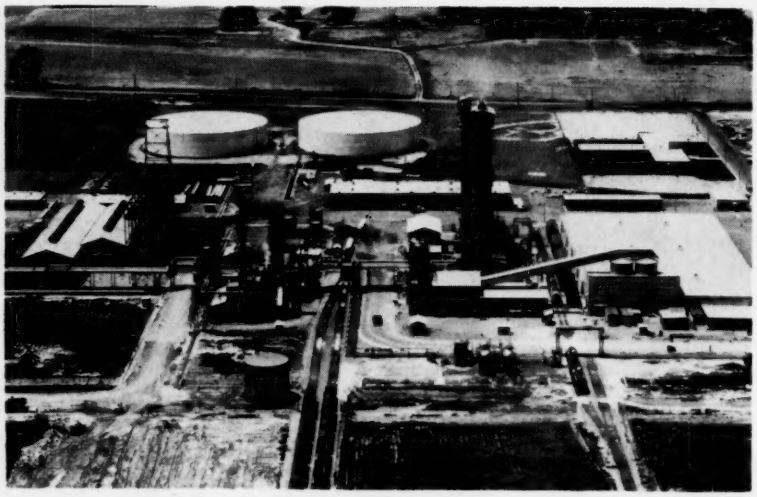

North of Memphis, Grace Chemical's nitrogen plant near Woodstock.

short pipeline the ammonia-process by-product that serves as the starting point for Cardox operations.

Familiar Stomping Grounds: Du Pont took a liking to Memphis and vicinity during World War II, while building and operating a government-owned munitions plant in the area. That plant was closed, but Du Pont management didn't forget Memphis. The points that prevailed when the site was chosen six years later: "relatively cheap natural gas and electrical energy, good labor supply, low tax rates, stable local government, adequate housing, and good schools." Proximity to the textile industry in the Southeastern states influenced location of the hydrogen peroxide plant, and low-cost power was a main factor in location of the sodium plant.

Grace Chemical chose its Memphis site after exhaustive studies on plant locations. Vice-president and general manager, William Haude, calls Memphis "a crossroads of materials and markets," cites as added attractions the water shipping, labor market, and reasonably priced natural gas and electricity.

Chapman Chemical—in Memphis since 1941—uses only a minor amount of locally produced raw material (clays for fillers), but is strategically situated for distribution—a large share of the market for wood preservatives is in the South.

Buckman Laboratories' decision to settle in Memphis was prompted by convenience of location; from this city, the company can provide optimum service to customers. In particular, the company likes overnight freight service to the port of New Orleans. And E. L. Bruce & Co. says it located in Memphis because of the availability of process materials, excellent water and other utilities, and a good labor market.

City Sites Scarce: Realtors say there's very little land still open for industrial development within the city itself, but plenty of land outside the city is available at prices ranging from $500 to $5,000/acre.

One prime industrial tract is on President's Island, which is now connected to the city by a causeway. This new $50-million Memphis Harbor and Industrial Area provides a current-free harbor and 960 acres of industrial sites.

Another big industrial area now being developed is the area north of the city, particularly at Woodstock. And near the new steam power plant site, a 6,000-acre area protected by levees, is being developed for industrial use.

The newly formed Memphis Industrial Development Committee is launching a national advertising and "goodwill ambassadors" program, aiming primarily at attracting chemical and electronics firms. And Du Pont plant manager Tom Bell predicts that if local conditions remain good, steady and solid growth for Memphis as a chemical center will result in a tripling of chemical plant employment in the community over the coming decade.

you, too, can profit from stability in OLEIC ACID

here's how Emersol 233 LL Elaine increases shelf-life of a surgical soap

Case History No. 83-02: A large manufacturer of surgical and germicidal soaps continually had problems of storage stability of a high grade surgical soap. The development of rancidity and changes in color were particularly disturbing to users of the soap especially where cleanliness and sterilization are imperative. Upon investigating Emersol 233 LL Elaine, this manufacturer found it so superior to the double distilled oleic acid he had been using, that it eliminated all problems of instability and odor development. Emersol 233 was also tried in other germicidal soaps in this manufacturer's line and the improvement in stability was again outstanding.

This is but one example of how outstanding stability improved a group of products. In any product, the replacement of ordinary oleic acids by a comparable Emersol grade prevents the development of rancid odors and avoids discoloration, breakdown of emulsions, changes in texture, and any deterioration of performance. So, why risk your products' good reputation when you can guard against failures so easily—by always buying the Emersol brand when you need oleic acids.

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Labor Suits Grind On

Overshadowed by last week's International Brotherhood of Teamsters' elections (see p. 48), but of more immediate significance to chemical-process management are six noteworthy labor litigations now in various stages of completion:

• Spencer Chemical Co.'s suit for a permanent injunction against picketing at its Pittsburg, Kan., plant and $250,000 in damages against International Chemical Workers Union and ICWU Local 244. Hearings are scheduled to resume Oct. 21 in Cherokee County district court, Columbus, Kan.

• Scobell Chemical Co.'s charge of unfair labor practices, filed with National Labor Relations Board claiming Teamsters Local 118 (Rochester, N.Y.) illegally invoked a "hot cargo" clause to boycott Scobell products.

• Coty's $1-million damage suit against Teamsters Local 815 (New York) in U.S. district court, charging violation of a contract by "unlawful" striking.

• Hearing now under way before NLRB to determine the proper bargaining unit for 1,500 Western Electric employees. Council of Western Electric Technical Employees—National complains the 1,500 were "thrust" upon its bargaining unit by the employer in an effort to "dilute" the professional character of the council.

• Postponement of a hearing on an injunction, filed in U.S. district court (Houston, Tex.) by NLRB against Local 450, International Union of Operating Engineers (AFL-CIO). The union had been enjoined earlier from picketing or striking to force Austin Co., Dow Chemical, and Sline Industrial Painters to assign work to Local 450, or to force Monsanto Chemical to cease doing business with several companies, including Sline.

• An Arizona trial jury has decided no one can be denied work because of nonmembership in a union, and has awarded $50,000 in damages to a sheetmetal worker who charged he was fired from his job because he was not a member of the union. Sheetmetal Workers International Assn. had unsuccessfully attempted to have the state supreme court block the trial on the grounds that state courts have no jurisdiction in cases involving labor laws.

Now! ISOPHTHALIC based paints and plastics are leading the way to superior products

Important new raw material of many uses

With Isophthalic now in plentiful supply from Oronite Chemical Company's 50 million pound per year capacity plant, paint manufacturers can produce new and better surface coatings that have superior flexibility, hardness, impact resistance, color and gloss retention. Plastics (Polyamides, Polyesters-amides, Polyesters) employing Isophthalic based resins open the door to new and better products at attractive cost.

Paint

With Isophthalic, longer oil length resins (up to 93%) can be built that dry faster to tougher films, and the longer oil length results in significant cost savings.

Baking Finishes

Isophthalic baking finishes are harder, have better gloss retention, are more resistant to alkali, water and mineral spirits. Less amino resin is required resulting in further cost savings.

Exterior House Paints

Formulation of Isophthalic alkyd oils with pentaerythritol and low rosin content tall oil fatty acids produces house paints with superior drying properties than those made from soybean oil. The harder drying films of Isophthalic paints have better resistance to mold growth, film checking and cracking than conventional linseed oil paints. Exterior house paints made with Isophthalic have superior weathering characteristics, excellent non-yellowing properties.

Interior Gloss Enamels and Flats

Odorless enamels and flats of excellent quality can be produced more economically with Isophthalic resins. Low rosin content tall oil acids used in longer (70-75%) oil length Isophthalic resins provides a low cost vehicle for interior enamels that are unusually flexible, have excellent gloss retention properties.

Industrial Finishes

Industrial finishes that dry faster, adhere better to metal and that retain their gloss longer are now possible with Oronite* Isophthalic. Such coatings are especially suitable as exterior structural steel paints, equipment finishes, enamel undercoatings and industrial primers.

Plastics

The superior properties of polyesters made with Isophthalic are maintained even at high styrene dilutions. With Isophthalic high viscosities can be adjusted by further dilution with styrene without loss in properties. The excellent performance of Isophthalic at greater styrene dilutions offers new economies in the cost of materials for resin solutions.

Plasticizers made with Isophthalic have greater thermal and color stability, higher boiling points, better resistance to oxidation, greater plasticizing efficiency and less toxicity and no odor.

Reinforced plastics, of unsaturated polyester type that withstand higher temperatures, that can resist more flexing, that have higher impact strength and that have better adhesion to glass are now possible with Oronite Isophthalic. When Isophthalic based plastics are reinforced with glass, these properties carry over into the laminates resulting in superior resistance to water erosion and pressure.

Let Oronite prove to you how Isophthalic can benefit your products. Oronite field representatives will be glad to demonstrate to you the many advantages of Isophthalic

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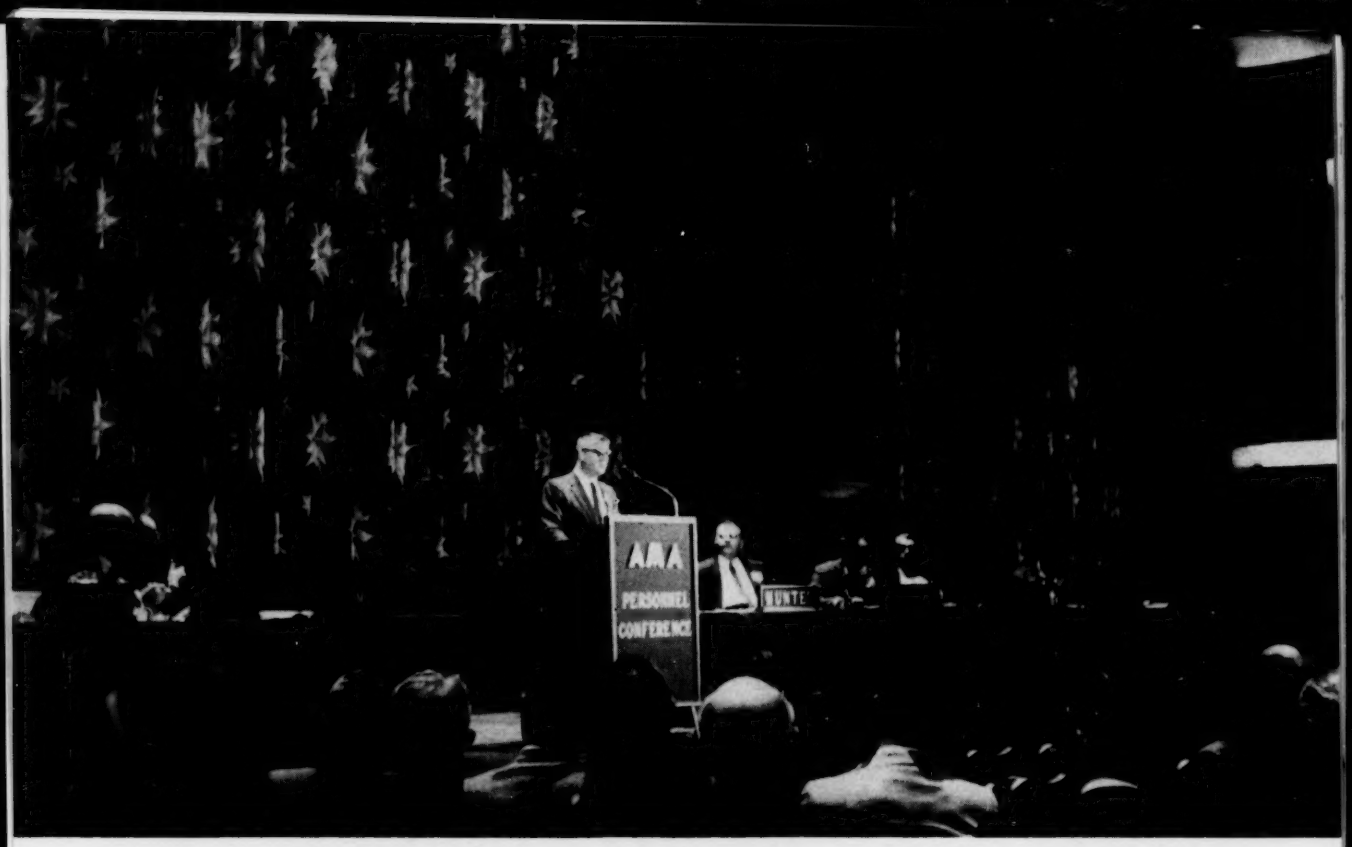


Gillette's Davis addresses AMA panel on union and nonunion plant problems; most companies are . . .

Still 'Anti' on Multiplant Bargaining

Most multiplant chemical companies are still standing firm against master labor contracts covering many plants in different locations, but at least one major chemical concern has recently modified its position against company-wide collective bargaining.

Speaking as a member of a panel discussing union pressures for master labor contracts, R. P. Fisher, American Cyanamid's labor relations manager, recently told a group of personnel and labor relations executives that Cyanamid has "basically opposed union pressures for master contracts, but this year the company decided to bargain on a company-wide basis on pensions and insurance only."

Fisher told registrants attending American Management Assn.'s fall personnel conference that Cyanamid's policy change was the result of periodic reviews of its employee-benefits program, coupled with the desire to extend certain benefits to all employees, and the over-all problem of negotiating the numerous technical points of the proposed new benefits program at local levels in 46 different plants.

Another panel member, Fred Hunter, manager of industrial relations at American Brake Shoe Co., told conferees that "master contracts tend to be contrary to the public interest, since they give union leaders the power to shut down a company—or an entire industry—because of a situation that may be peculiar to a single plant."

Since power is concentrated in the hands of a small group of labor leaders, he said, local union members tend to lose autonomy and freedom of action, and employees may find themselves supporting a strike they do not want or sympathize with.

Alan Stackpole, general manager of industrial relations for Union Carbide, reaffirmed his company's determination to oppose multiplant bargaining.

He cited, as an example, the four-month strike against four plants of Linde Air Products Division earlier this year, during which, he said, the union made an effort to enter into multiplant agreements. Carbide held out, he went on, and finally separate contracts were signed for each plant.

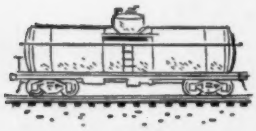
Nonunion Personnel: Personnel policies are not different in a nonunion plant, Paul Davis, vice-president, industrial relations, for Gillette Safety Razor Co., told the 1,200 executives attending the conference. "Policies must be based on a philosophy that treats employees as individuals and that has the backing of top management."

He listed 10 principles used by Gillette in dealing with nonunion employees, including:

- Pay wages equal to or higher than prevailing area wages.
- Provide guaranteed retirement income, free hospital and medical service, sickness and accident insurance, life insurance, and paid holidays and vacations.
- Adjust complaints promptly and fairly, and provide an "open-door" policy for employees to discuss problems with management.
- Maintain good communications, including bulletin boards, letters to employees' homes, literature on the company, suggestions systems, and opinion surveys.
- Provide steady work at steady pay and offer promotions based on merit and seniority.

Service on all these handling operations...

Transportation



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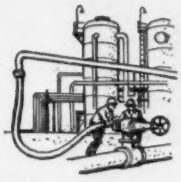

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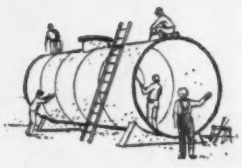
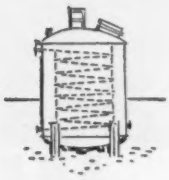


Inhibitor Removal



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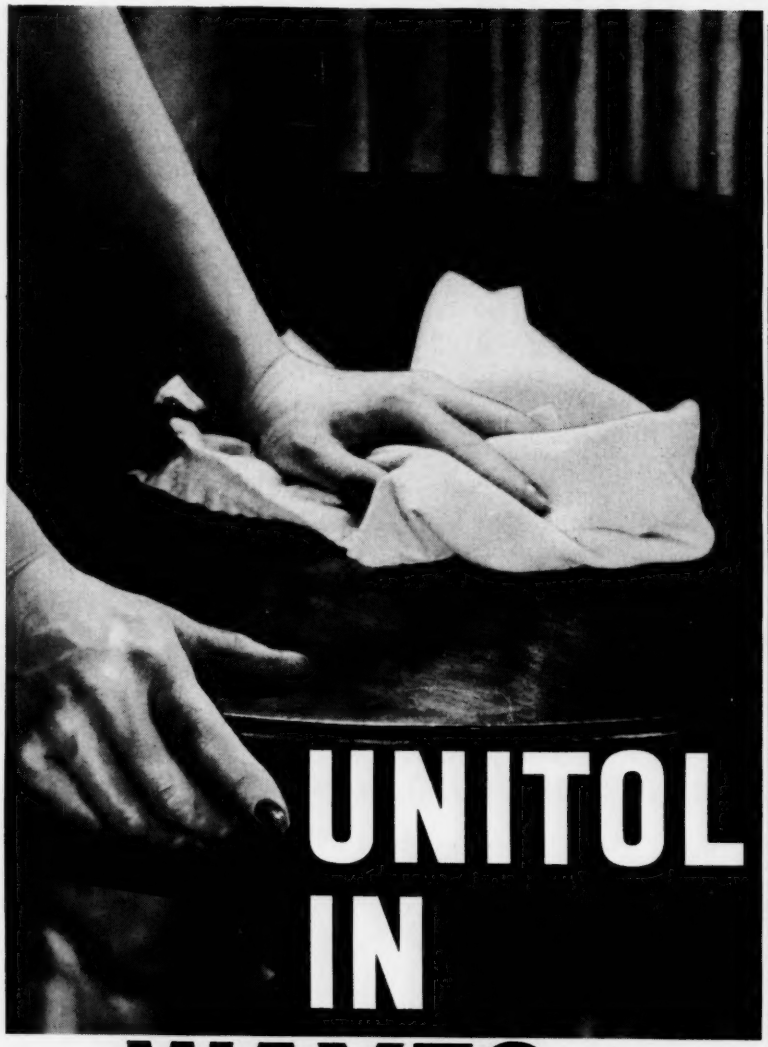

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LEGAL

Texas City Disaster Suit: Trial date for the latest litigation growing out of the 10-year-old Texas City, Tex., fertilizer explosion has tentatively been set for March 4 in U.S. district court at Houston. The litigation involves damage claims totaling $55 million and a petition to limit liability.

The suit—an admiralty proceeding, much like the one involving damage claims growing out of the *Andrea Doria-Stockholm* collision in July '56—resulted from the explosion in 1947 of two ships loaded with fertilizer purchased by France under the Marshall Plan. Fires caused by the explosion raged for three days, cost 570 lives, seriously injured 3,500 and caused an estimated $32.8 million in damage (*CW, April 20, p. 33*).

Both the Republic of France and the French Line—owner of one of the ships—filed petition to limit their liability.

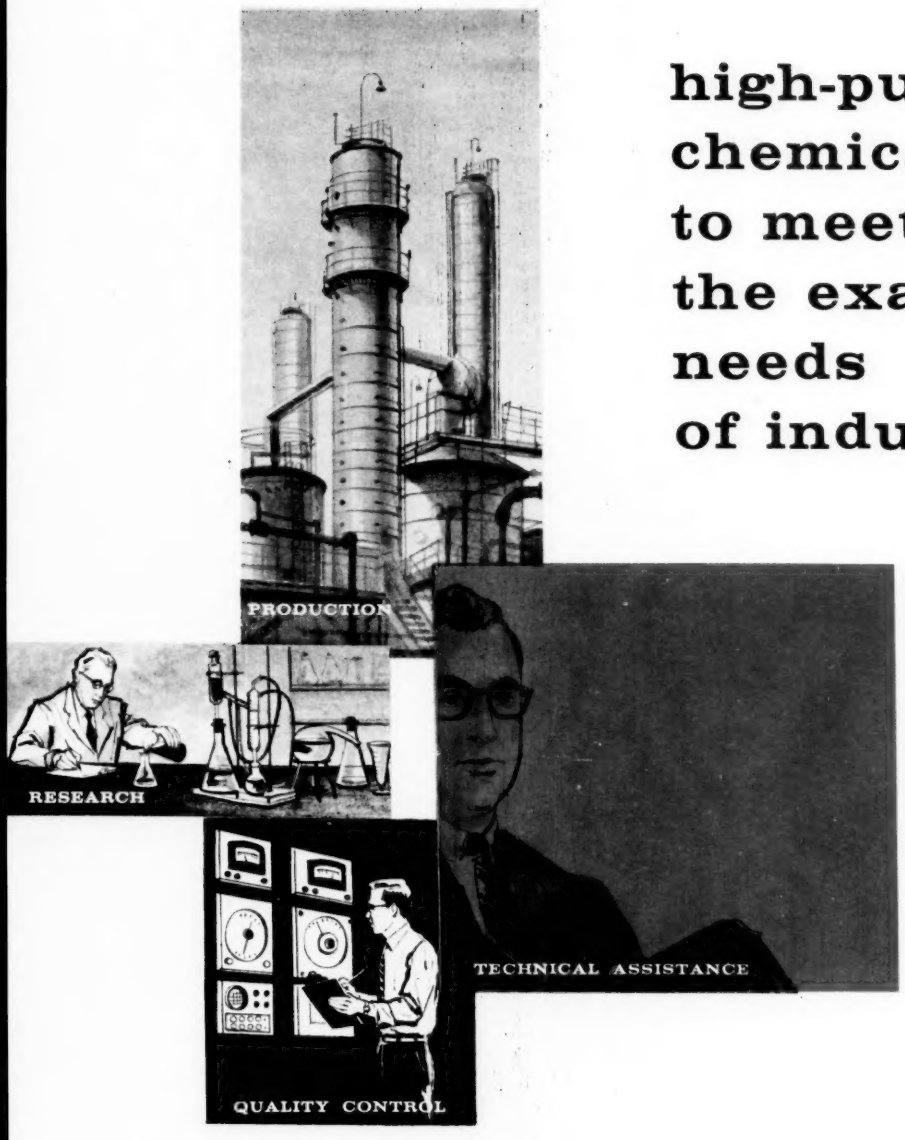
Damage claims were filed by many claimants, including the U.S. government, some on behalf of employees of Monsanto's styrene plant adjacent to the slip where the French ship *SS Grandcamp* was being loaded with ammonium nitrate at the time of the explosion.

The federal government became a claimant as a result of the 1955 Texas City Relief Act; it provided for government payments (as a matter of grace), through the Secretary of the Army, of up to $25,000 for individual personal injury, death and property claims. A condition to receiving payment under the act required that claimants assign any rights of action they might have against third parties, such as the ship owners, to the U.S. government. The government has almost concluded payments totaling $16.5 million to some 1,700 claimants.

In '53, the U.S. Supreme Court ruled in the Dalehite case that the U.S. government was not liable under the Federal Torts Claims Act for damages caused by the explosion.

The government now is in federal court to enforce rights assigned to it by those who received government compensation. Other claimants include those whose damages were not fully covered by insurance or by terms of the Relief Act.

If the French petition to limit liability is granted, the claimants would have virtually nothing to share. On



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ADIPIC ACID $(CH_2)_4(COOH)_2$

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Applications: manufacture of adipic acid esters; used in rubber, plastics, petroleum, chemical and allied fields.

Shipment: 50-lb. multi-ply paper bags (2,000-lb. "Pillar Pac" bulk containers).

DIGLYCOLIC ACID $O(CH_2COOH)_2$

Dibasic acid completely soluble in water and lower alcohols. Reacts with alkalies to form acid and neutral salts; with alcohols to form esters; with ammonia to form the amide or the six-membered cyclic imide. White crystals.

Application: manufacture of resins and plasticizers.

Shipment: 50-lb. multi-ply paper bags.

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Relatively strong organic acid. Miscible in all proportions with water and water-soluble organic solvents. Straw-colored liquid.

Applications: used in acid detergents, electropolishing and electroplating solutions, dyeing and tanning.

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PROPIONIC ACID CH_3CH_2COOH

An organic acid soluble in water, alcohol, and most organic solvents.

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Highly versatile and reactive. Du Pont Methanol features dependable uniformity and a purity exceeding 99.85%. Clear, colorless liquid.

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Straight-chain alcohols containing an even number of carbon atoms, ranging from C-8 (n-octyl) to C-18 (stearyl). Can be esterified with acid; oxidized to corresponding aldehydes and further oxidized to corresponding acids.

Applications: emulsifying and softening agents in cosmetics, salves and ointments; in manufacture of plasticizers, lubricating-oil additives; as anti-foam agents. Readily sulfated to form excellent detergents.

"Lorol" 5, 7, 9 and 11

Technical lauryl alcohols made up principally of lauryl and myristyl alcohols. Insoluble in water; completely miscible with methanol, 95% ethanol, ethyl ether and benzene. Viscous colorless liquids.

Shipment: tank cars and 55-gal. drums.

"Lorol" 20 $CH_3(CH_2)_6CH_2OH$

Essentially n-octyl alcohol. Slightly soluble in water; completely miscible with methanol, 95% ethanol, ethyl ether. Viscous colorless liquid.

Shipment: tank cars and 55-gal. drums.

these Du Pont chemicals

"Lorol" 22 $CH_3(CH_2)_8CH_2OH$

Essentially n-decyl alcohol. Insoluble in water; completely miscible with methanol, 95% ethanol, ethyl ether, benzene, cyclohexane, carbon tetrachloride, ethyl acetate, and acetone. Viscous colorless liquid.

Shipment: tank cars and 55-gal. drums.

"Lorol" 24 $CH_3(CH_2)_{14}CH_2OH$

Cetyl alcohol available in National Formulary grade. Insoluble in water; soluble in methanol, 95% ethanol, ethyl ether, benzene. White, waxy flakes.

Shipment: 125-lb. fiber drums.

"Lorol" 28 $CH_3(CH_2)_{16}CH_2OH$

Stearyl alcohol available in technical and U.S.P. grades. Insoluble in water; slightly soluble in methanol, 95% ethanol, ethyl ether, benzene. White, waxy flakes.

Shipment: 50-lb. paper bags (industrial grade) and 50-lb. fiber drums (U.S.P. grade).

SOLVENTS

CYCLOHEXANOL—"Hexalin"* $C_6H_{11}OH$

Excellent solvent for gums, waxes and resins. Clear, colorless liquid.

Applications: manufacture of ester plasticizers; non-corrosive degreasing agent for metals; diluent thinner of fuel-oil additives; stabilizer in textile soaps.

Shipment: tank trucks, tank cars and 55-gal. non-returnable steel drums. Available through your local Du Pont Chemical Distributor.

CYCLOHEXANONE—"Hytrol"* O $C_6H_{10}O$

Outstanding solvent for nitrocellulose, polyvinyl chloride and its copolymers, resins and plastics. Clear, colorless liquid.

Applications: used in many types of finishes; active ingredient in vinyl dispersions; solvent for DDT.

Shipment: tank trucks, tank cars and 55-gal. steel drums. Available through your local Du Pont Chemical Distributor.

FORMAMIDE $HCONH_2$

Exceptional solvent for inorganic salts, casein, gelatin, animal glue, starch, lignin, glucose and zein. Completely miscible with water, methanol, ethanol. Technical—clear, colorless liquid.

Applications: solvent; softener; intermediate in manufacture of pharmaceuticals and formic acid.

Shipment: tank cars and 55-gal. non-returnable steel drums.

METHYL FORMATE $HCOOCH_3$

Solvent for cellulose ethers and esters, acrylic resins and polyvinyl acetate. Contains 97% of the ester by weight. Soluble in water; miscible with most organic solvents. Clear, colorless liquid.

Applications: solvent; in manufacture of formates and other organic chemicals including sulfa drugs; as an ingredient in production of fumigants.

Shipment: tank cars, 10- and 55-gal. drums.

OTHER CHEMICALS

DIMETHYL SULFATE $(CH_3)_2SO_4$

Highly reactive, economical to use. Boiling point of 188.8°C. permits use at atmospheric pressure. Soluble in alcohol, ether and benzene. Clear, colorless liquid.

Applications: important methylating agent in organic synthesis; used in manufacture of many synthetic drugs, and in certain dye intermediates.

Shipment: tank cars and special 10- and 55-gal. returnable steel drums.

UREA—Crystal and Shotted $CO(NH_2)_2$

Most versatile of all basic chemicals. Du Pont Urea is a time-tested product of highest quality and uniformity. Supplied in two forms . . . white crystals or pellets (Shotted).

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Shipment: both forms supplied in 100-lb. multi-ply paper bags. Available through your local Du Pont Chemical Distributor.

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Check listing on next page for the name of your nearest Du Pont Chemical Distributor or Du Pont Polychemicals Department District Office . . .

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Los Angeles	Braun Corporation
San Francisco	Braun-Knecht-Heimann Co.
COLORADO	
Denver	The Chemical Sales Co.
FLORIDA	
Jacksonville	Apperson Chemical, Inc.
Miami	Biscayne Chemical Labs, Inc.
Orlando	Lenfestey Supply Company
Tampa	Lenfestey Supply Company
GEORGIA	
Atlanta	Chemical Services, Inc.
ILLINOIS	
Chicago	Central Solvents & Chemicals Co.
Chicago	Phillips & Martin Co.
INDIANA	
Ft. Wayne	Hoosier Solvents & Chemicals Corp.
Indianapolis	Hoosier Solvents & Chemicals Corp.
KANSAS	
Wichita	Barada & Page, Inc.
KENTUCKY	
Louisville	Dixie Solvents & Chemicals Co.
LOUISIANA	
New Orleans	Southern Solvents & Chemicals Corp.
MARYLAND	
Baltimore	Leidy Chemicals Corp.
MASSACHUSETTS	
Boston	Howe & French, Inc.
MICHIGAN	
Detroit	Western Solvents & Chemicals Co.
Grand Rapids	Wolverine Solvents & Chemicals Co.
MINNESOTA	
St. Paul	Lyon Chemicals, Inc.
MISSOURI	
Kansas City	Barada & Page, Inc.
Kansas City	Missouri Solvents & Chemicals Co.
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METROPOLITAN NEW YORK	
Lyndhurst, N. J.	Stoney-Mueller, Inc.
NEW YORK	
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Buffalo	Chemical Sales Corp.
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Rochester	Chemical Sales Corp.
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Cincinnati	Amsco Solvents & Chemicals Co.
Cleveland	Ohio Solvents & Chemicals Co.
Toledo	Toledo Solvents & Chemicals Co.
OKLAHOMA	
Tulsa	Ward Chemical & Supply Co.
OREGON	
Portland	Van Waters & Rogers, Inc.
PENNSYLVANIA	
Pittsburgh	Vitro Manufacturing Co.
TENNESSEE	
Memphis	Chapman Chemical Co.
TEXAS	
Dallas	Texas Solvents & Chemicals Co.
Dallas	Van Waters & Rogers, Inc.
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Houston	Van Waters & Rogers, Inc.
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Salt Lake City	Braun-Knecht-Heimann Co.
Salt Lake City	Wasatch Chemical Co.
WASHINGTON	
Seattle	Van Waters & Rogers, Inc.
Spokane	Van Waters & Rogers, Inc.
WISCONSIN	
Milwaukee	Wisconsin Solvents & Chemicals Corp.

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South Norwalk	Merchants Chemical Co., Inc.
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Knoxville	F. H. Ross & Co.
Nashville	Burkart-Schier Chemical Co.
TEXAS	
Dallas	Van Waters & Rogers, Inc.
Houston	Van Waters & Rogers, Inc.
UTAH	
Salt Lake City	Braun-Knecht-Heimann Co.
WASHINGTON	
Seattle	Van Waters & Rogers, Inc.
WISCONSIN	
Milwaukee	Merchants Chemical Co., Inc.

FOR "HEXALIN" & "HYTROL" O

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Los Angeles	Braun Corporation
Los Angeles	Mefford Chemical Company
San Francisco	Braun-Knecht-Heimann Co.
ILLINOIS	
Chicago	Central Solvents & Chemicals Co.
INDIANA	
Fort Wayne	Hoosier Solvents & Chemicals Corp.
Indianapolis	Hoosier Solvents & Chemicals Corp.
KENTUCKY	
Louisville	Dixie Solvents & Chemicals Co.
MASSACHUSETTS	
Boston	Howe & French, Inc.
Worcester	Chemical Sales & Service Co., Inc.
MICHIGAN	
Detroit	Western Solvents & Chemicals Co.
MISSOURI	
Kansas City	Missouri Solvents & Chemicals Co.
St. Louis	Missouri Solvents & Chemicals Co.
NEW JERSEY	
Newark	C. P. Chemical Solvents, Inc.
OHIO	
Cincinnati	Amsco Solvents & Chemicals Co.
Cleveland	Ohio Solvents & Chemicals Co.
Toledo	Toledo Solvents & Chemicals Co.
TEXAS	
Dallas	Texas Solvents & Chemicals Co.
Houston	Texas Solvents & Chemicals Co.
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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

ADMINISTRATION

the other hand, if the claimants can prove negligence—which they must do in this case—on the part of the French Line skipper, or possibly the ship owner, the French stand to lose heavily. Observers agree, however, that it's extremely difficult to prove negligence in this kind of admiralty proceeding. Meanwhile, the litigation is still nowhere near an end.

IDEAS

Plant Swimming Pool: Employees of National Petro-Chemicals Corp. and U.S. Industrial Chemicals Co. plants at Tuscola, Ill., are all set for next summer with a giant aluminum swimming pool, part of a recreation area planned for the neighboring plants. Employees formed the Cornfield Chemical Club, volunteered to build the pool. National Distillers Corp.—parent company of USI and half-owner of Petro-Chemicals—gave the club $85,000 for the project.

•

DCAT Man of the Year: Drug, Chemical and Allied Trades Section of the Young Men's Board of Trade of New York next week will present its first "Young DCAT Man of the Year" award. It will go to a man between the ages of 21 and 35, employed in the drug or chemical industry in the New York area, who has "the most outstanding record of accomplishment in both industrial and civic affairs."

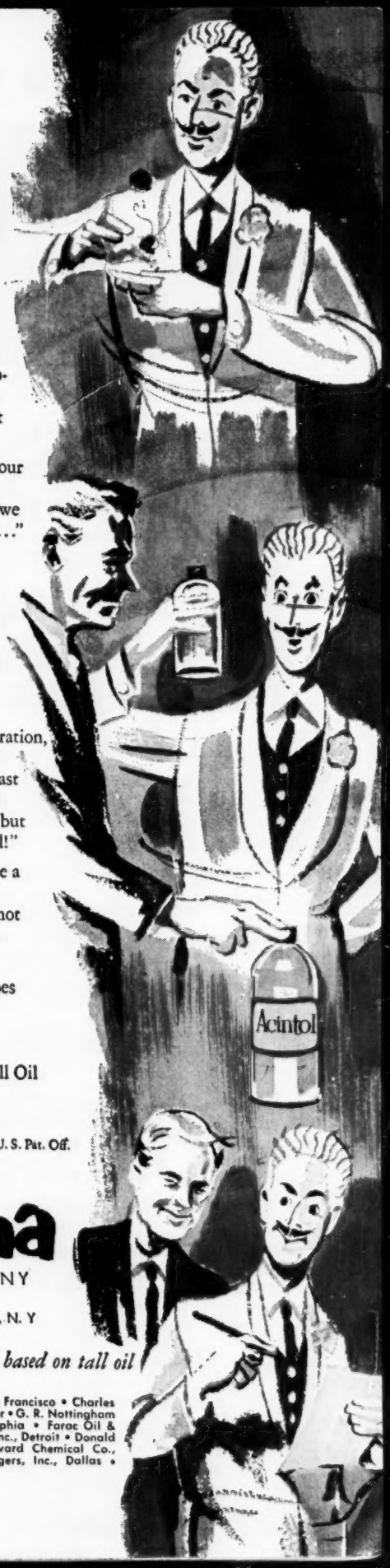
•

AIChE Symposium: On Oct. 22, American Institute of Chemical Engineers will hold a series of symposiums at New York's Hotel Statler. Symposium papers will cover control engineering creativity, patent disclosures, professional engineering and profitability projecting.

LABOR

OCAW Beats Independents: Oil, Chemical & Atomic Workers Union (AFL-CIO)—which is now petitioning for a representation election at Union Carbide's Carbide Chemicals Co. plant at Institute, W. Va.—has defeated two "raids" on the part of independent unions in Ohio. At Lima, OCWA retained bargaining rights at the Standard Oil refinery by beating National Industrial Workers Union, 274 to 168; and at Youngstown, employees of Union Carbide's Linde plant de-

The man who rolled his own



Then there was this P.A. of *exceedingly* individual tastes. Couldn't abide ready-to-wear suits. Had his shirts hand-stitched. Even rolled his own cigarettes – couldn't find any packed to his liking.

You could see it coming when we made our first call. "We use only raw materials *exactly* suited to our processes. Not that we don't *like* to save money, you know, but..."

"Of course," we said, fetching up an ambrosial sample, "and we think our ACINTOL* FA – Tall Oil Fatty Acid is tailor-made for your alkyds." He picked up the bottle gingerly. *"Tailor-made?* But, remember, we need excellent color stability." We said, "Couldn't fit better."

He frowned. "But odor is a vital consideration, and naturally we couldn't..." We lifted the lid, he sniffed carefully, then took a last deep breath. "But isn't it –" he blanched –"cheap?" We thought he had us there, but we said, "Well, let's say it's – economical!"

"Young man," he said, "you seem to have a perfect understanding of our particular needs," and signed on the dotted line – not only for ACINTOL* Fatty Acid, but for our ACINTOL* D – Distilled Tall Oil.

If you are particular, too, about what goes into your alkyds, esters, emulsions, fatty acid amines, non-ionics, primer surfaces for automobiles, sulfonated oils or the like, look into ACINTOL* Tall Oil Products. It's so easy to get samples, typical analyses, technical assistance – just ask us!

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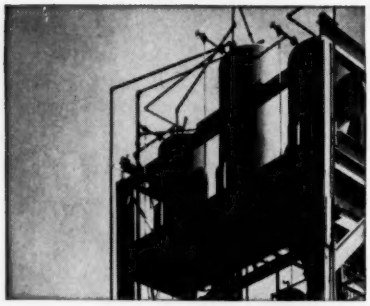

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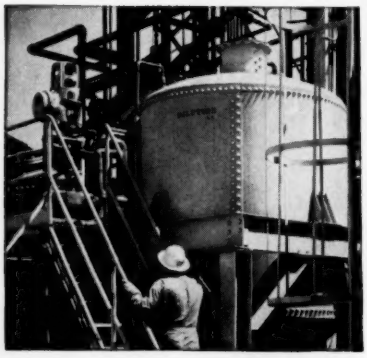

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ADMINISTRATION

cided by 6-to-5 vote to stick with OCAW and reject Linde Air Employees Assn. OCAW also came out on top in a four-way election at the St. Paul Ammonia Products plant in Pine Bend, Minn. At Union Carbide's chemical plant at Torrance, Calif., maintenance men turned down AFL-CIO Metal Trades Council, 88 to 25.

•

Long-Range Answer: The National Labor Relations Board can help to eliminate some corrupt practices in labor-management relations, but the long-range answer to this problem, according to NLRB Chairman Boyd Leedom, lies in the hearts of men. Truly satisfactory relations, Leedom says, will come "only when employees' welfare is of more importance than increasing profits to management, and a union member's individual rights mean much more to the union leader than his own income and power in the union."

•

No Secrets Among Friends: Letting its employees in on developments in bargaining sessions is a principal point in an employee communications program that won an award for Timken Roller Bearing Co. (Canton, O.) in the annual competition sponsored by the Chamber of Commerce of the U.S. The Timken plan also includes lecture meetings for supervisors and other employees, plus regular articles by company President William Umstattd in the employee magazine, explaining the company's views on industrial relations topics.

Award winner Umstattd: In contract talks, no secrets from employees.

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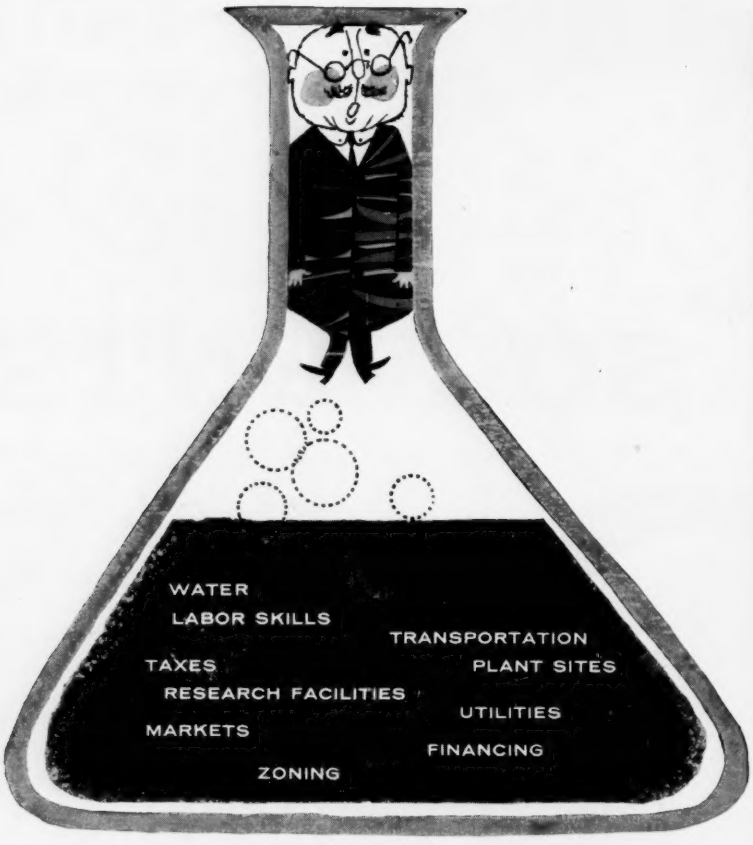

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ADMINISTRATION

KEY CHANGES

Raymond F. Evans, to president; and **A. H. Ingley,** to executive vice-president; Diamond Alkali Co. (Cleveland).

Fred M. Butler, to director, Cities Service Oil Co. (Bartlesville, Okla.).

L. I. Dana, to vice-president—research and development; and **David Swan,** to director of research, Linde Co. division; Union Carbide Corp.

George B. Kirk, to director of research and development, Kaiser Gypsum Co. (Oakland, Calif.).

Edwin T. Asplundh, to chairman of the board; and **Joseph A. Neubauer,** to president, Columbia-Southern Chemical Corp., wholly owned subsidiary; Pittsburgh Plate Glass Co.

T. Patrick Dougan, to executive vice-president and general manager; and **Glen E. Mallory,** to treasurer-vice-president; American Latex Products Corp. (Hawthorne, Calif.).

R. Emerson Lynn, Jr., to manager, chemical engineering research, B. F. Goodrich Research Center (Brecksville, O.).

Kenneth Robbins, to manager, industrial engineering, Industrial Rayon Corp. (Cleveland).

Allen S. Clarke, to director, Vitro Corp. of America (New York).

Harold D. B. Roberts, to director, Division of Veterinary Medicine, Norwich Pharmacal Co. (Norwich, N.Y.).

Marc A. Dupont, to general manager, Glidden International, C.A., foreign operating subsidiary, Glidden Co. (Cleveland).

J. Paul Kirk, to director, National Lead Co. (New York).

William J. Roberts, to director of research, Summit Research Laboratories (Summit, N.J.), Celanese Corp.

RESIGNED

John A. Sargent, president and director, Diamond Alkali Co. (Cleveland).

DIED

Loren C. Hurd, 52, president and director, Metals Disintegrating Co. (Union, N.J.), at Milford, Pa.

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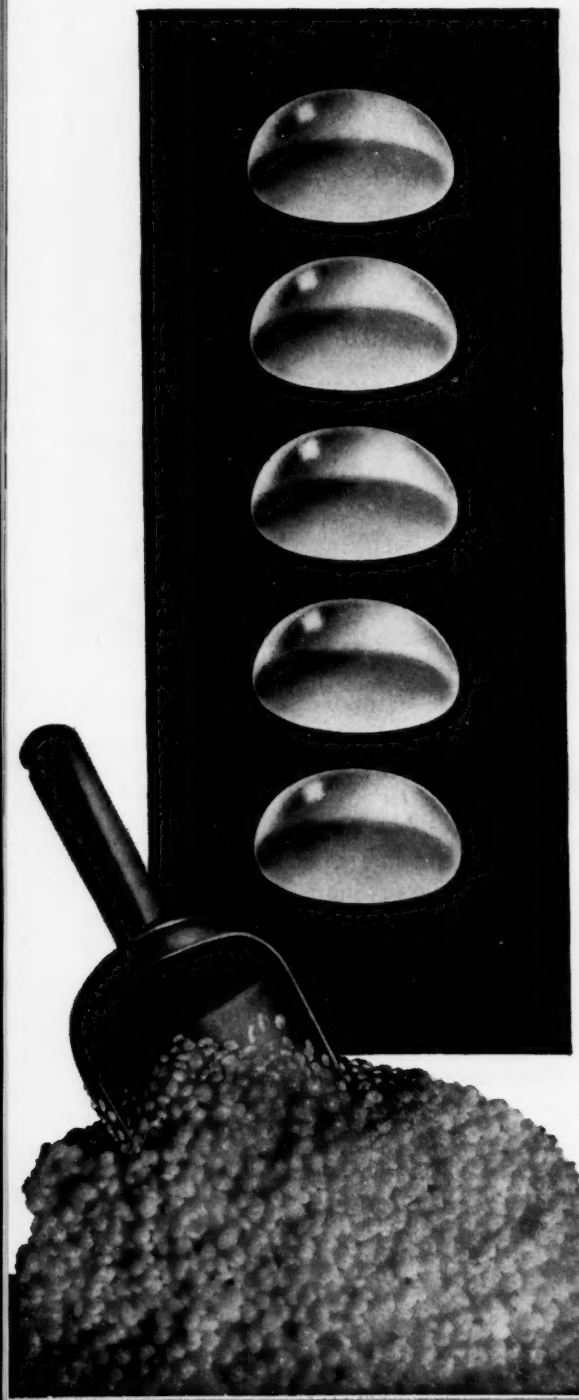

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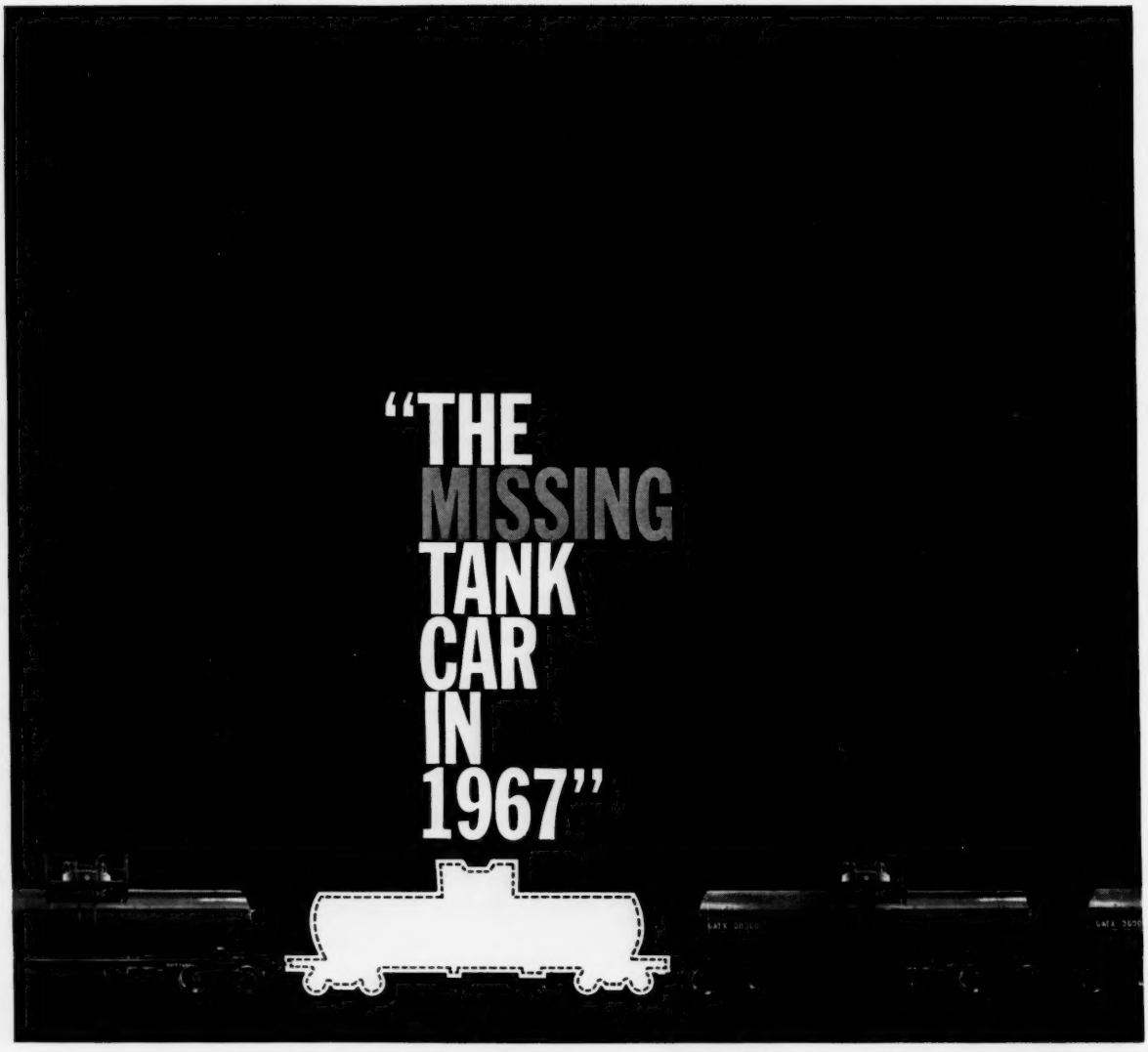

"Somebody was guilty. Here we are—production coming out of our ears—sales opportunities popping in every direction—new profits practically under our noses—and somebody had failed to order enough general-purpose tank cars to make deliveries.

We should have seen it ten years ago. Way back in 1957, almost every economist kept telling us business would expand more than 50% in the next decade—steel was going to be tough to get—normal obsolescence would subtract even more cars and new tank cars couldn't be built overnight. But—we put off doing anything about it. Then it was too late. Maybe your company can benefit from our experience."

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Mounting storm of export trade difficulties is the reason why chemical . . .

Traders Now Tack Toward Bigger Imports

Prodded by competition from U.S. chemical producers' swelling export organizations, pressed by rising foreign production, and harried by a host of tariff, currency and license barriers, merchant traders are going after chemical imports with a vengeance. This week, for example, Baird Chemical Corp. (New York), largest of the chemical export-import companies, kicks off a campaign to induce foreign companies to sell their exports to the U.S.

Many other traders, *CW* learns, plan to follow suit. In fact, a large number of them—possibly the majority—have already started the switch to imports. Pharmaceutical and fine-chemicals traders lead the trend. Hit hard by U.S. expansion abroad, they have in many instances all but given up exporting, or are limiting their export activities to transshipping foreign materials.

What will this mean to U.S. chemical producers? Precise figures are impossible to come by. But exports now account for about 60% of the larger merchant traders' business. Within the next few years, many traders hope to reverse their export-import ratio, to heft imports up to the 60-70% mark. Since a big trader may do a yearly business of $4-8 million, this trend could mean a significant increase of incoming chemical traffic, possibly as great as 15-25%—$40-60 million* more than last year's shipments of $274 million.

Polite Reciprocation: Up to now, most export-import houses have tried to operate without "stepping on producers' toes," by bringing in largely noncompetitive goods. This hasn't been entirely a matter of choice. Producers have been known to cut off sales to traders bringing in competitive goods. But since they are also being squeezed by these producers' own export divisions, more and more traders are deciding that reciprocity isn't worth the game. They will be bringing in all they can, selling where they find buyers, and depending on imports for an increasing proportion of their profits.

Battle at the Gates: Any dramatic surge in imports is sure to fuel the already torrid tariff fires. U.S. producers, now smarting under the present import levies, are actively seeking higher tariffs or quotas.

Some traders are clearly worried about tariffs. Those who specialize in

*Necessarily a rough estimate. It assumes, among other things, that independent traders account for 10-15% of all U. S. chemical exports, that they now operate on a 60/40 export-import ratio, that all exporters also handle imports, and that traders' total volume, as a result of the switch, would be unchanged. Actually, the ratio varies considerably among traders, although the 60/40 ratio is quite common. The 10-15% share of exports is also variable. Moreover, though most traders are both exporters and importers, a few operate exclusively in one or the other areas.

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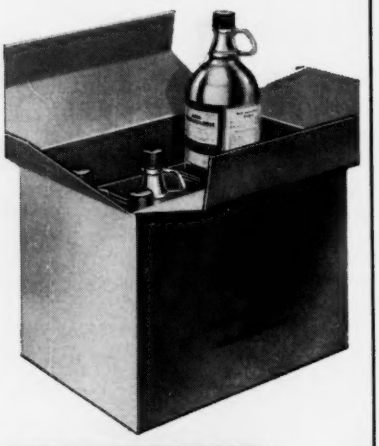

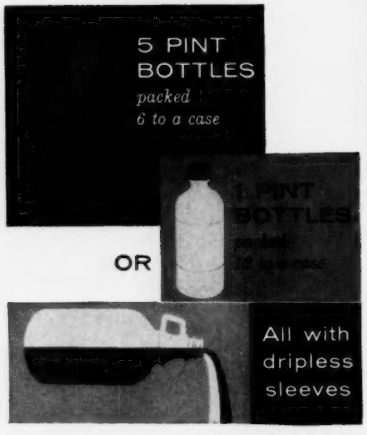

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pharmaceuticals have already been pushed almost out of exporting race, now face serious trouble with imports.

A customs court decision, if upheld against a current appeal, may have a shattering impact on drug imports. It would establish a principle that would classify a broad range of pharmaceutical chemicals as synthetic and compounded, replacing their previous organic, uncompounded designation. This would mean a 7½% tariff hike.

While importers now view the reclassification as a foregone conclusion, they are fighting a move to make the tariff boost retroactive to Aug. '56. The levy would not only wipe out millions of dollars in profits, importers say, but would also put smaller firms out of business.

Aside from present and possibly higher tariffs, chemical importers find themselves bucking "prejudice" of U.S. manufacturers and wholesalers toward foreign goods. Many big producers, they complain, will not buy foreign chemicals, despite their own sizable export business.

Rocks and Shoals: But while importers have their troubles, exporters must swim a wider sea of woes.

- Foreign competition: Greatest obstacle to U.S. exports is the rapidly expanding European chemical industry. Producers and exporters alike assert that the combination of lower prices and more liberal credit terms offered by European—particularly German—producers has already bitten into foreign demand for U.S.-made chemicals, and bids fair to chew away even more.
- Tariffs: As foreign chemical plants spring up and make their countries self-sufficient in certain chemicals, tariffs spring up, too. The merchant exporters, by skipping around the market as demand shifts, are still doing business. But how long they can play this game is a worrisome question.
- Internationalizing: As they become increasingly international-minded, U.S. producers have been setting up their own export divisions, making their own sales arrangements, and hence becoming less inclined to sell to independent traders, knowing they may be competing with themselves. The trend toward setting up plants abroad also hurts the export houses.
- Financial troubles: Unfavorable balances of trade have prompted some countries, e.g., Japan, France and India, to clamp down on imports. Unstable money conditions in South America have occasionally erupted into situations that have put small exporters out of business, hurt even the largest.

The Big Survive: Emerging from this pressure kettle of foreign trade are a still-substantial number (probably several hundred) of export-import houses. But trade sources estimate that since the Korean War, at least 75% of export-import houses (mostly one-man companies) have disappeared. The "department store" houses, which handle a variety of goods, have lost much of their chemical business.

But for the merchant traders who are weathering the storms of trade, the total outlook is good. Because they are fighting competition in foreign markets, producers with their own export divisions or agents will still often sell to independent traders (in "neutral"—unmarked—containers), knowing the chemicals are going to a country where their firms are already represented. And even the largest companies—like Du Pont and Union Carbide—often find it more economical to appoint merchant traders as agents for their products in various parts of the world. These producer connections loom steadily larger in traders' plans to stay in the export business.

Advantages: Traders have several advantages in competing on the world market. Flexibility is one of the biggest. James Baird, president of Baird Chemicals, explains it this way: "It pays for me to send a man up the Amazon, because if one sale falls through, he can probably make others on the way. The moderate-size producer, with a limited line, can't afford the risk."

And because he isn't tied to one line, the world-market trader can stay in business if one market collapses. Pricing flexibility and the ability to quote fast are two other assets the traders claim over producer sales offices.

Service—Key to Survival: Above all, today's successful trading firms emphasize service. "We aren't just selling price," comments Fred S. Fallek, president of Fallek Products Co. (New York). "We serve as the foreign

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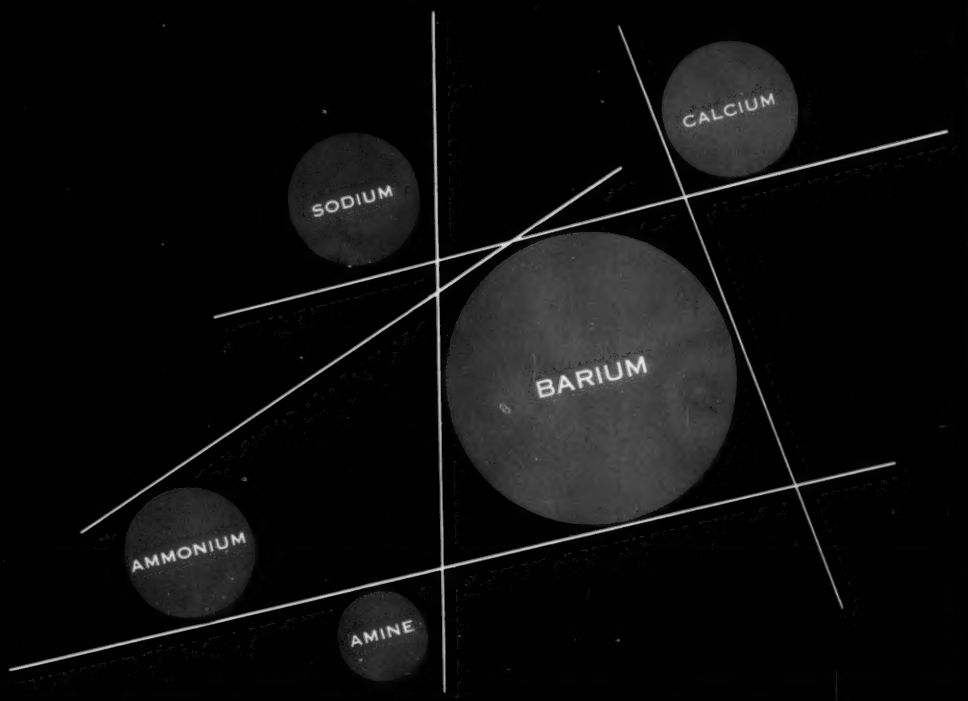

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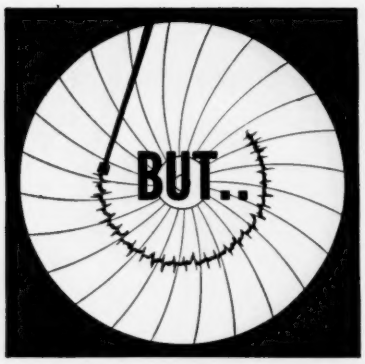

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- Solvents can be reused indefinitely. During periods of solvent shortages, efficient recovery is invaluable.
- Fire and health hazards are reduced and you have a closer check on solvent evaporation rates.

Solvent recovery plants are designed to suit your particular needs whether 50 or 100,000 gallons a day. In most cases, solvents can be recovered with an efficiency of more than 99% at a cost of 1 to 2¢ per pound. The investment is moderate too. Some recovery plants running at capacity pay for themselves in less than a year. Under other conditions, it takes only two or three years.

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arm of U.S. industry, offering our experience and knowledge of the foreign mentality, the intricacies of foreign trade and currency regulations, and of changing markets."

The large trading firms provide technical information, suggest formulations, guide buyers to sources. They allow U. S. producers to conduct foreign operations on a domestic basis, and serve as a centralized buying service for both U.S. and foreign firms.

Liberal credit policies are another reason why the bigger traders are thriving. Many producers will not extend the credit terms necessary to compete with those offered by European firms. The exporting house will, in effect, finance the sale by purchasing the goods from the producer, then extending terms to the buyer. Generous credit should help the traders' drive for imports. Currently, U.S. producers are experiencing increasing demand from domestic customers for better terms. Traders will also occasionally hold funds for firms located in dollar-short countries.

Re-exporting has also aided export-import houses to maintain export volume. A few firms, in fact, attribute as much as half of their total volume to exports, though they no longer handle U.S.-made goods. They hold their imported stocks at ports of entry under bond, then ship them upon order.

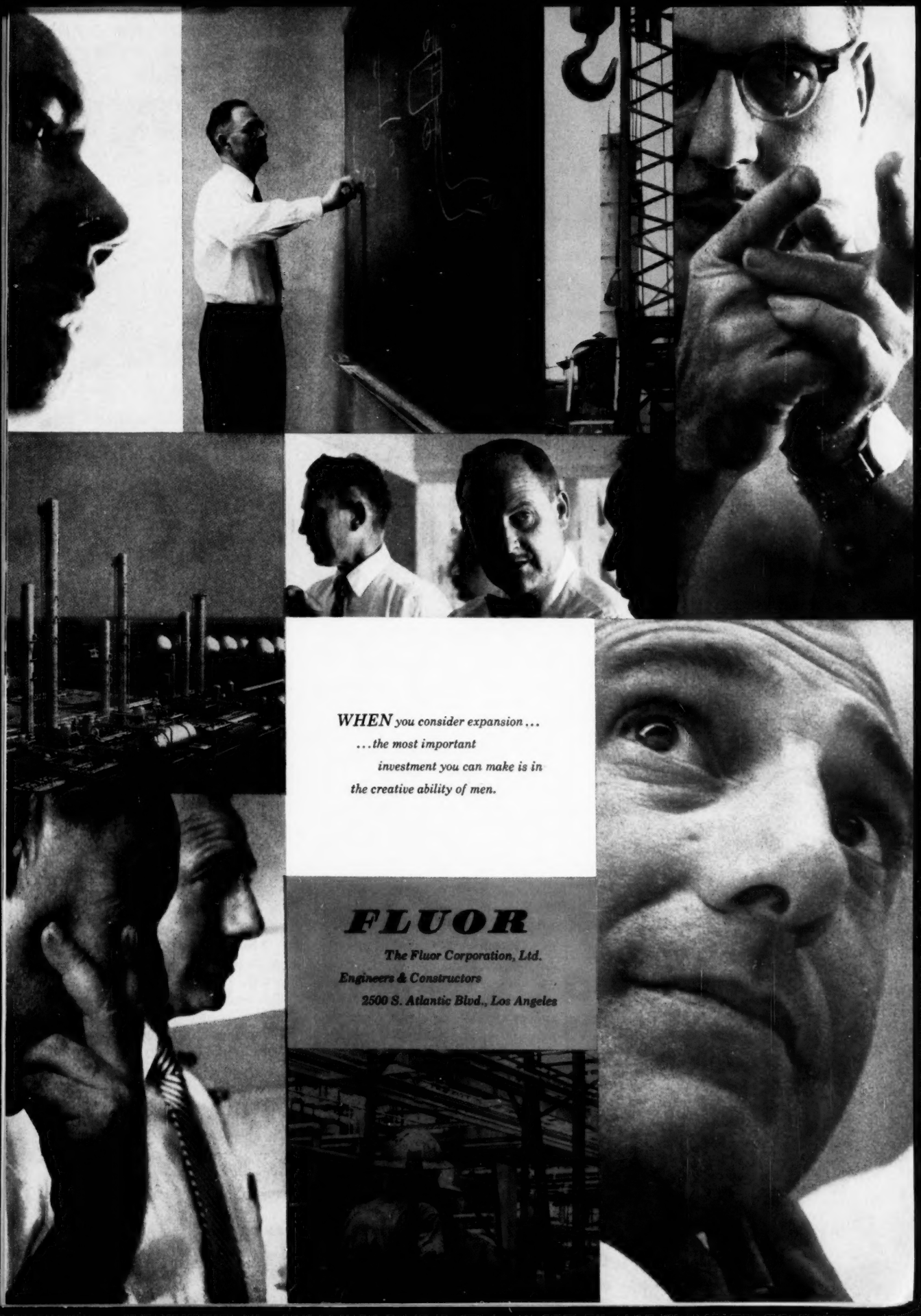
This kind of trading demands a sizable inventory, because getting an order often hinges on fast quotations and delivery. It's another case of the big company surviving, the shoestring operator failing.

Adding Up: Thriving on a market imbalance and resulting opportunities for bargain purchase and sale, traders see a generally bright future. Although the export situation isn't too bright, the traders expect that U.S. overcapacity in chemicals will prevent domestic sources of supply from drying up, will enable them to buy at low prices for competitive resale abroad.

Imports, however, are the real key to the traders' future. Expanding foreign production will provide the fuel for the big drive, help boost U.S. receptiveness to foreign products. Only a drastic, upward spurt in tariffs, an insatiable foreign demand for chemicals, or an economic slump could thwart plans for a sizable increase in U.S. chemical imports.

DATA DIGEST

- **Polyurethane elastomer:** New, comprehensive brochure presents facts on thermal stability, peroxide concentration, carbon black level, solvent resistance, low temperature behavior, adhesion and physical properties. Much of the data is plotted. Chemical Division, General Tire & Rubber Co. (Akron, O.).
- **Acrolein:** 40-page booklet describes chemistry of acrolein and methacrolein, unsaturated aldehydes with reactive double bonds and carbonyl groups. Physical properties and applications for 14 acrolein derivatives are discussed. Union Carbide Chemicals Co. (New York).
- **Thioglycolic acid:** Chemical reactions with oxidizing agents, alcohols, aldehydes and ketones, halides, diazonium chlorides, nitriles and other compounds are covered in 20-page booklet. Uses in pharmaceutical, resin, phenol, amine, rubber and gasoline manufacture are suggested. Evans Chemetics Inc. (New York).
- **Latice stabilizer:** Data sheet describes SRS-55, anionic stabilizer for compounded natural and synthetic latices and a surfactant for emulsion polymerization of monomers. Seaboard Chemicals, Inc. (Salem, Mass.).
- **Scale remover:** Properties of Drycid, dry, inhibited acid for rust prevention and scale removing, are delineated in new data sheet. Oakite Products, Inc. (New York).
- **Arginine:** Specifications of arginine base and arginine glutamate and their application to diseases involving high ammonia levels in blood are covered in three-page report. Mann Research Laboratories (New York).
- **Mould inhibitors:** Folder outlines use of sodium and calcium propionate as mould and rope inhibitors in food processing. Eastman Chemical Products, Inc. (New York).
- **Amyl acetate:** Uses suggested in surface-coating solvents, antibiotic extraction, perfumes, textile spotting, printing inks and other fields. Physical properties and specifications are included. Union Carbide Chemicals Co.
- **Anhydrous ammonia:** Specifications, transportation, storage and handling equipment, applications, and chemical and physical properties comprise contents of 11-page brochure. Henry Bower Chemical Mfg. Co. (Philadelphia).



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Product training makes new technical salesmen in rapid time.

'Crash' Course Shapes Staff

Are "crash" programs of technical training for nontechnical salesmen effective? After watching the results of its crash training program for a year, Archer-Daniels-Midland Co. (Minneapolis) this week was ready to tag its effort a success.

Proof, ADM feels, comes from the progress of the eight graduates. In the year since graduation, two of the men have become branch managers; another, sales manager of linseed oil in the home office. The course at least speeded up these promotions. And all of the men are successfully selling ADM products today.

The program, according to J. W. Moore, ADM vice-president and director of marketing, stemmed from a sales expansion program that demanded technically trained men in a hurry. Selling ADM's line of about 300 chemical products (protective coatings, glycerides and fatty acids) is a technical job. ADM had to draw men from the nontechnical lines and run them through the 90-day course that covered the ground of a two-year college course in protective coatings technology. Only three of the students had any previous chemical training, and only one had professional chemical experience. The other two had studied chemistry in college, then had gone on to business careers.

Curriculum: The course stressed product knowledge, not sales technique. The program lasted three months, with 9½ hours a day crammed with lectures, lab periods, tours and talks by company officials.

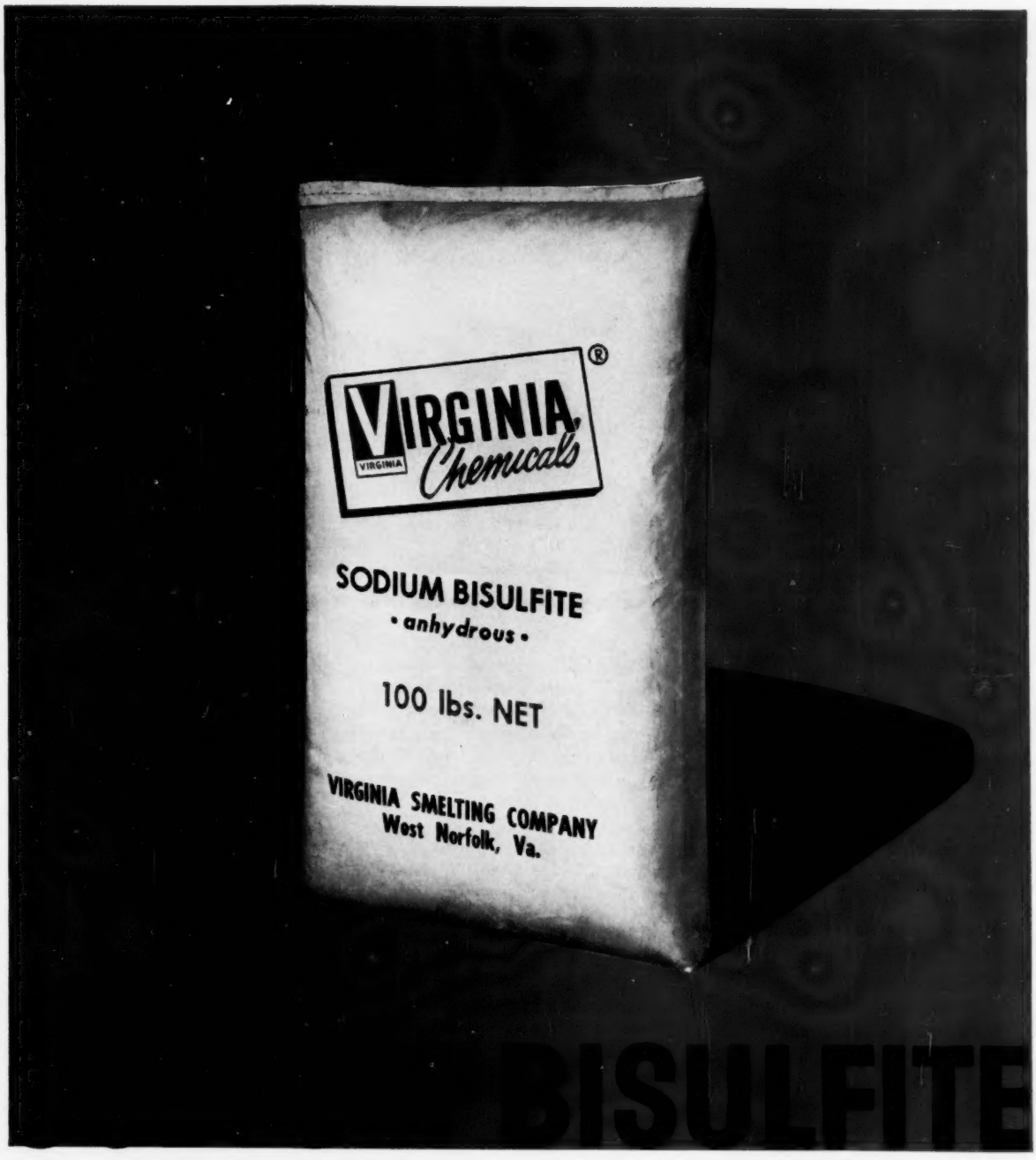
Most lecturers were ADM research laboratory men, but outside experts furnished "a change of face and pace" for the busy sessions.

About half the day was spent in the lab, following up lectures. Topics included fats and oils, paint composition, manufacture, and types, binders, pigments, dryers, printing inks, sales charts, industrial finishes and chemical products. The class-laboratory grind was broken up by eight tours to ADM processing installations, pilot plant, test fence site, and to an industrial finish plant to watch product applications.

Besides affording first-hand technical training, the lab sessions gave students a chance to meet the men they'd later rely on to follow up their sales work. One put it this way: "It's a great help to know that the guy to whom you are writing daily for technical advice will give you some personal attention. And it helps if you understand some of his problems."

Mixed Group: One problem that developed was the difficulty of aiming the curriculum at a mixed group. One student wanted more information about chemical products; another found the resins material inadequate. Because the pupils varied in technical background, their instructors found it difficult to keep the material stimulating for the technical men and at the same time understandable for the others.

Tests Tell: Written examinations followed almost every lecture. Post-graduation sales territory assignments



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Knowledge of lab services help nontechnical salesmen make sales.

depended partly on class standing. Course planners laid heavy stress on the written examinations. The quizzes, stepping up the study pace, impressed students with the seriousness of the course and pointed up individual weak spots that could be shored up in time.

The technical men started with an advantage, but—of the top scorers—nontechnical men finished the tests in second and fourth places. Age may also have been a factor—younger men had the higher averages, and the top scorer, with a 97.3 course average, was the youngest student—24 years old. All of the four highest scorers were in their 20s.

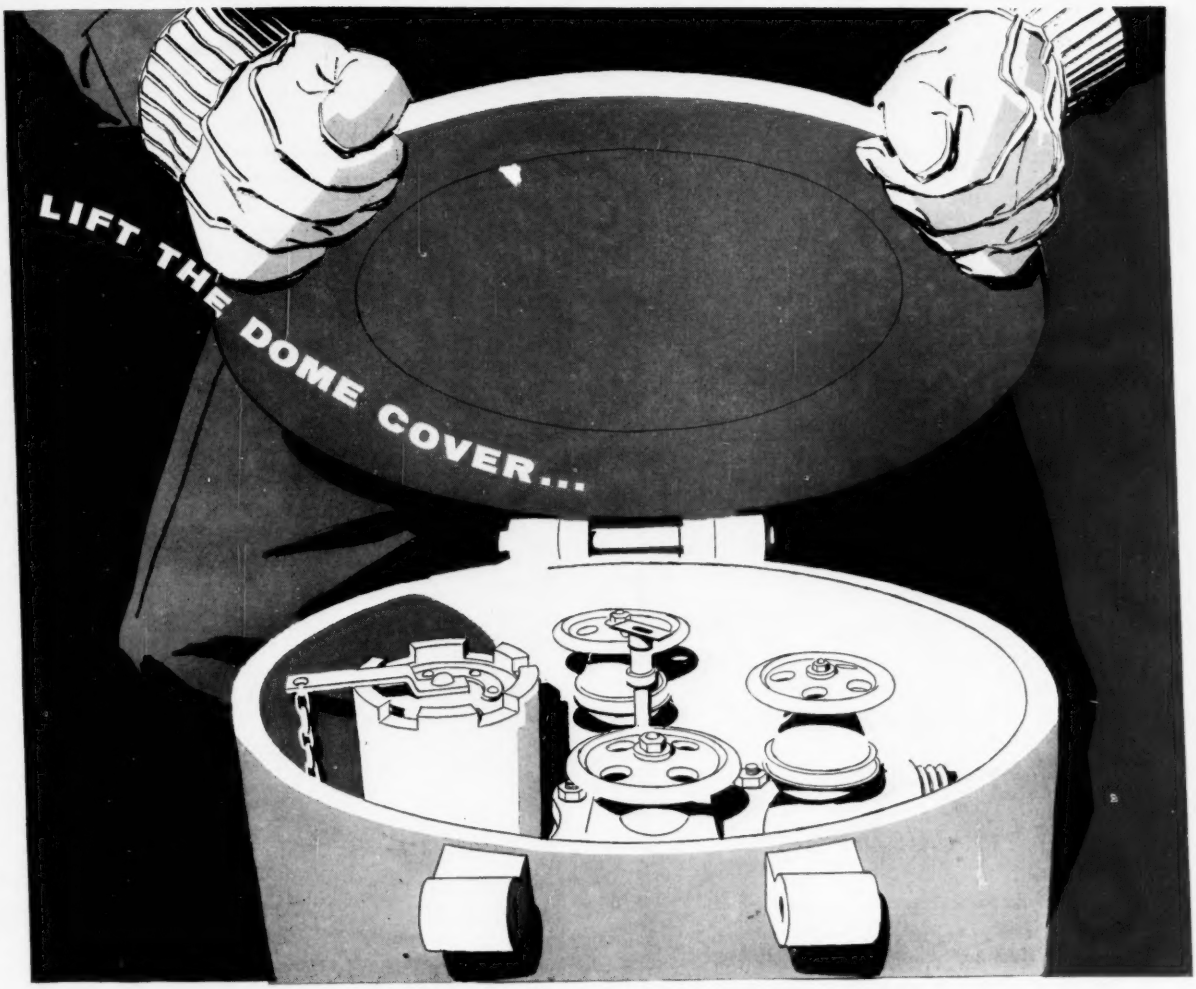
Student Reaction: The students received the course enthusiastically, a feeling still retained after months of actual sales experience. In retrospect, most agree that the lecturers threw the material at them too thick and too fast to be easily assimilated. But the multitude of facts gradually resolved into a useful body of knowledge. One salesman explains: " . . . as the months go by, and as repeated contacts are made with these things, they become first-hand knowledge . . . the trainee has had an opportunity to work with the products himself and has seen what they will do. He's not merely quoting someone else."

Another nontechnical man added: "A very professional and thorough job of converting and channeling my thinking was accomplished in a very short period of time. This fact has enabled me to learn faster and take better advantage of my experience in the field."

On the negative side, several graduates agreed there was one "major disadvantage" to the course: lack of information on competitive materials.

Next Time: If ADM gives the course again, it will make some minor changes. Stress would be heavier on practical information. That would be more effective in familiarizing salesmen with the task of solving customer problems. Territory assignments would not be revealed until the end of the course, because advance knowledge of assignments makes the trainees impatient. And course planners would allow other personnel to sit in on some of the specialized lectures.

The course cost ADM about $26,260, including $12,350 for trainee time and $10,370 for lecturers' time. For that sum, ADM obtained eight salesmen with the product education necessary to communicate customer problems to lab personnel, close liaison between salesmen and the lab staff and extra training know-how. Even the instructors profited from the bone-up necessary for lecture preparation. That's why ADM would be more than willing to try a crash program again if the need arises.



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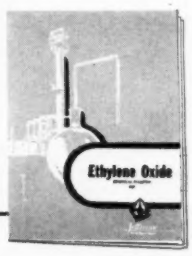

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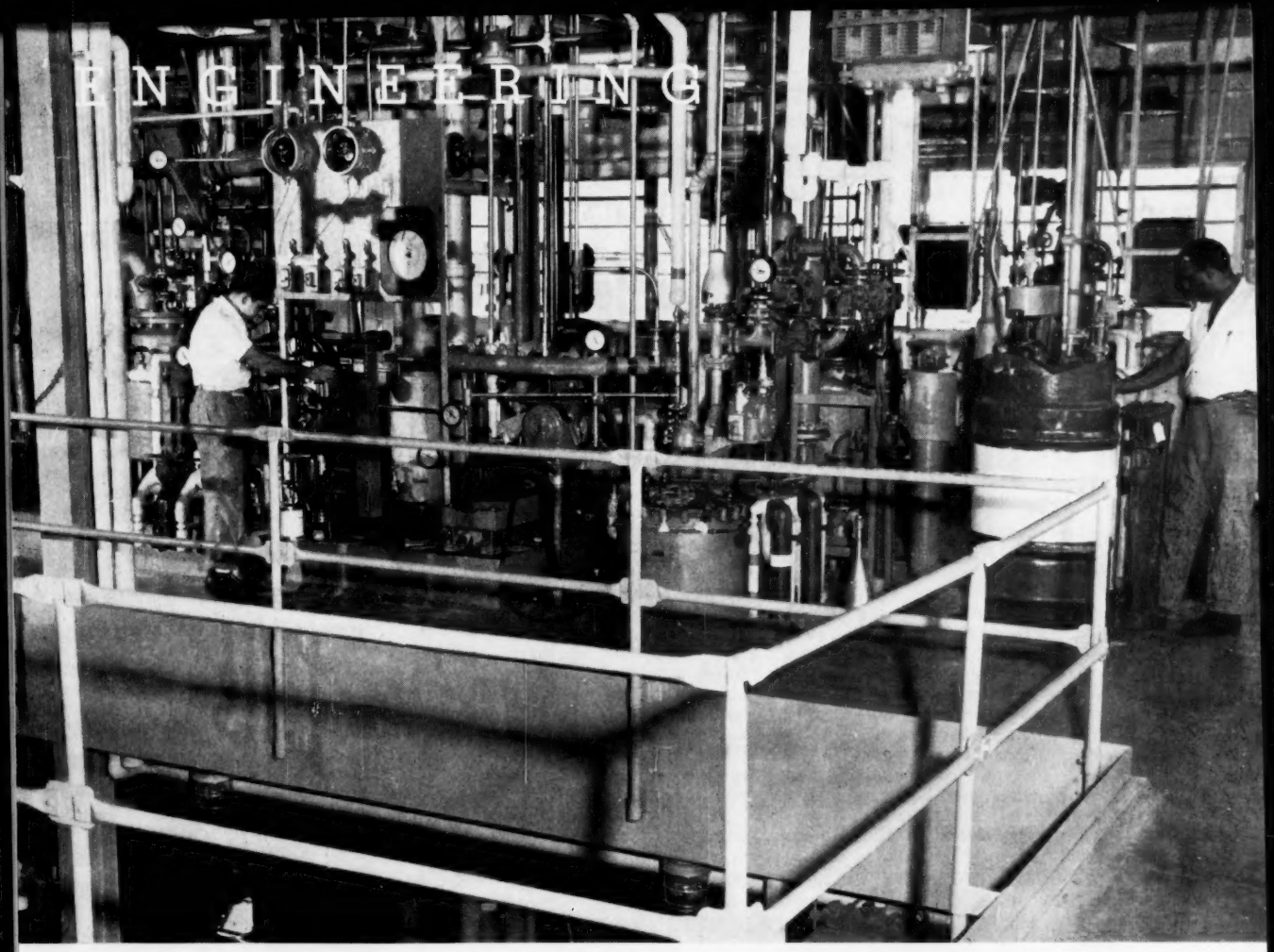


Pilot-scale research finds room to grow in new 10,000-sq.-ft. unit where Nopco proved . . .

How to Build a Pilot Plant on a Budget

Despite the rising costs of labor, materials and chemical equipment, Nopco Chemical Co. (Harrison, N.J.) has proved that it's still possible to keep construction costs within budget bounds. Key: meticulous attention to details. The proof: Nopco's new multipurpose pilot plant—which was completed for just under $350,000.

Initial planning for the facility started in Jan. '53 with a survey of the company's existing pilot-plant operations. The former pilot plant, in 15 years of operation, had developed into a key engineering job of Nopco's industrial division. In addition to the conventional pilot-plant activity of investigating and scaling up laboratory processes to commercial size, it served as a training ground for sales and production personnel, as a semiworks plant for the production of new chemicals (in quantities to 75,000 lbs./year) for field testing and market surveys.

But the old quarters were taxed to the limit of their capacity by increasing numbers of developmental projects for Nopco's other production divisions, left

Richter (left), Muhlmeister map cost shortcuts.

Titan Superjectors—continuous-type centrifuges—operate as long as a month without shutdown for cleaning. ASK FOR BULLETIN 946.

Pfaudler

Pfaudler Corrosioneering News Published by The Pfaudler Co., Rochester, N.Y.

How 15 men put Pfaudler equipment "on stream" and keep it in prime condition

The man hurried up the ramp into an airplane. As soon as he landed, a taxi rushed him to a train. Another taxi sped him to a ship. Ashore, still another taxi carried him to his destination: a Pfaudler customer's plant.

This performance, although out of the ordinary, illustrates well the first duty of our fifteen field service supervisors: when there's trouble, get there fast; downtime costs money.

The eldest of this group has been servicing Pfaudler equipment for 45 years. The "youngest," relatively new with Pfaudler, has 20 years' experience in chemical processing.

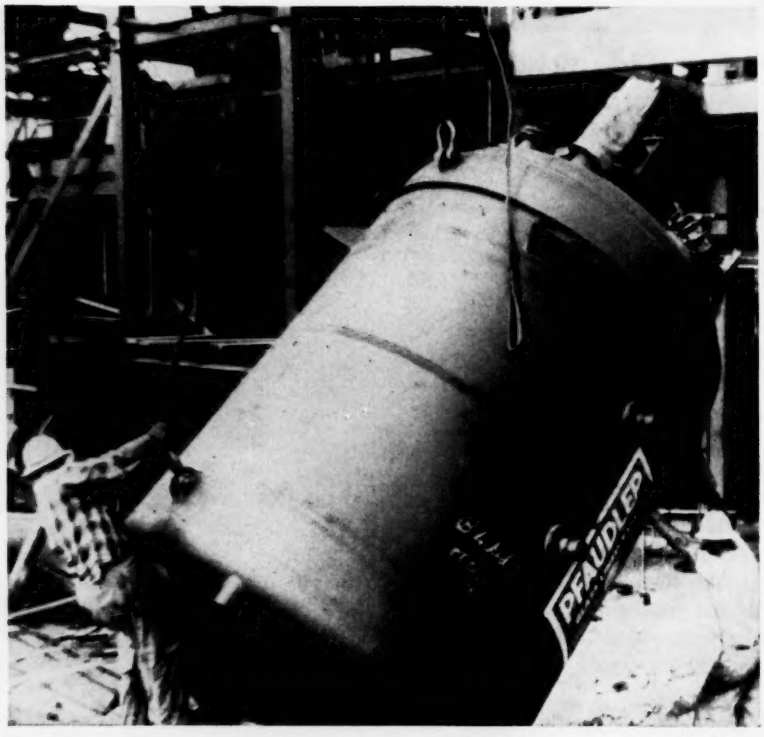
That's the second mark of these men: experience and ability: ability to hire and direct a crew of riggers, ability to actually repair equipment in the field.

Recently, in an unusual case, a customer's plant was badly damaged by fire. A Pfaudler tank needed extensive repairs, so the servicemen removed the tank from the line, shipped it to our plant, and reinstalled it at the customer's plant—all within a single week.

That's another dimension of the job: making quick decisions and knowing when to request assistance from the production, research, and engineering men in the home plant.

The key words for the whole program are customer service—service in helping to get a plant started, routine service to assure long use life, and prompt repair service to keep downtime to an absolute minimum.

Users of Pfaudler process equipment know that this Field Service Department is itself just a part of our complete program which also includes frequent seminars on corrosioneering, maintenance classes, some of which are held in customer plants, a Customer Advisory Board to review new designs, and complete laboratory pretesting facilities.



Supervision of installation crews at the plant site. Pfaudler field servicemen save time, often avoid equipment damage, and assure operational efficiency. To help get equipment into place quickly, lifting lugs are conveniently located on all Pfaudler vessels.

More compact drive delivers higher power... gives wider agitation range

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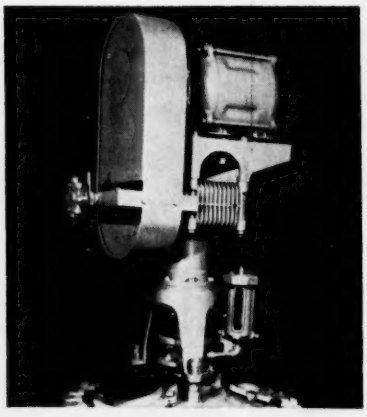

leaves surrounding areas more accessible, and elimination of cumbersome supports. All this we have done with our new Type "W" Drives.

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- The motor is mounted out of the way *above* the drive.
- When you want 100% explosion-proof construction and wide, variable speed range, you can specify hydraulic motors.
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Standard 2.5W, 3W, 4W, and 5W Drives are equipped with constant speed sheaves with static-free belts that can be combined to give any required speed for the agitation you desire.

Complete data in Bulletin 951. Check the coupon for a copy.

Corrosioneering News

Quick facts about services and equipment available to help you reduce corrosion and processing costs.

1957 Annual Report tells something about you

Send for a copy of our latest annual report and you'll learn something about yourself.

You and men like you throughout the world purchased more than $30,000,000 worth of Pfaudler equipment last year.

Just in this country alone you increased your purchases by 20 *percent*.

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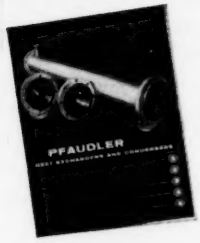
This report, then, is about you because you made it possible. Check the coupon for a copy.

Advanced heat exchanger designs in new bulletin



Bulletin 949, just off the press, contains 28 pages of information dat on Pfaudler's flexible standard and custom-built heat exchangers, including applications, types available, design specifications and operating characteristics.

You can get *two-week delivery* on stainless steel tube sheet with carbon steel shell-type, single- and double-pass fixed tube shell heat exchangers. Capacities: 56, 104, 149, 216 and 316 sq. ft. Larger sizes can be supplied in four to six weeks. Custom designs include titanium, zirconium, karbate, etc.

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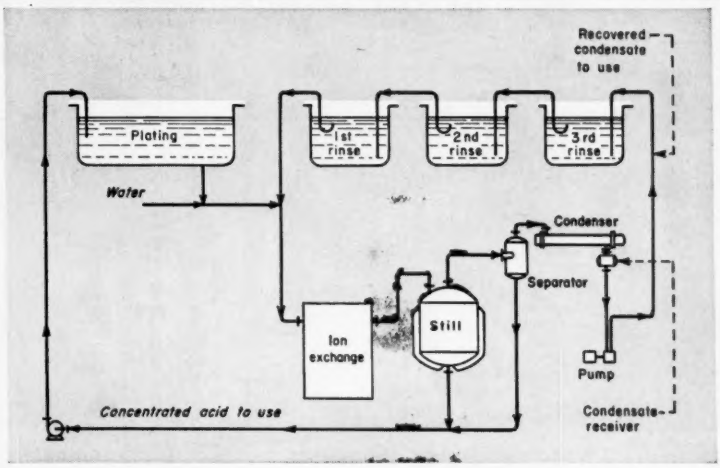

Platers turn waste disposal into extra profits

Like many other industries, platers have long had the problem of getting rid of contaminated waste. With the help of Pfaudler equipment and engineering, many of them now reclaim valuable materials and re-use solutions they used to dump.

In the case of chromium plating baths, for example, water is removed from the dilute acid solutions to obtain a concentrated solution of plating strength. Polluted rinse water is no longer sent down the sewer.

With the new system, you intercept used wash water contaminated with chromic acid. Boiling in a still removes most of the water. The recovered acid returns to the plating tank and the water, recovered in a condenser, returns to the wash system.

These wastes are extremely corrosive. Still, the materials selected for equipment must give long, economical service life. It is also very important that the system itself does not contaminate the recovered solutions.

On both counts Pfaudler glassed steel has been found to be the only material that will resist the corrosive attack of acids such as 25% to 45% chromic acid solution.

Similar systems can be used to recover sulfuric acid solutions, some metal cleaners, nickel and nickel salts, copper, gold, silver, and various cyanides.

An article on the system described appeared in the November 1956 issue of *Products Finishing* magazine. Send the coupon for Reprint No. 522.

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Please send me the information checked: ☐ Type "W" Drives, Bulletin 951 ☐ 1957 Annual Report ☐ Heat Exchangers, Bulletin 949 ☐ Recover that plating waste, Reprint No. 522 ☐ Buyer's Guide, Bulletin 947 ☐ Titan Superjectors, Bulletin 946.

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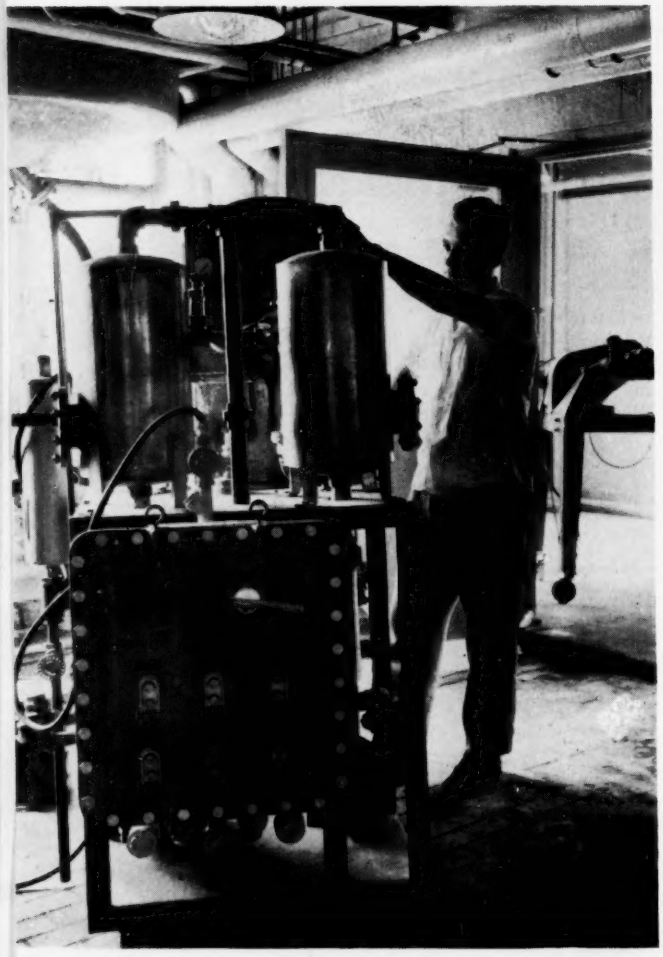
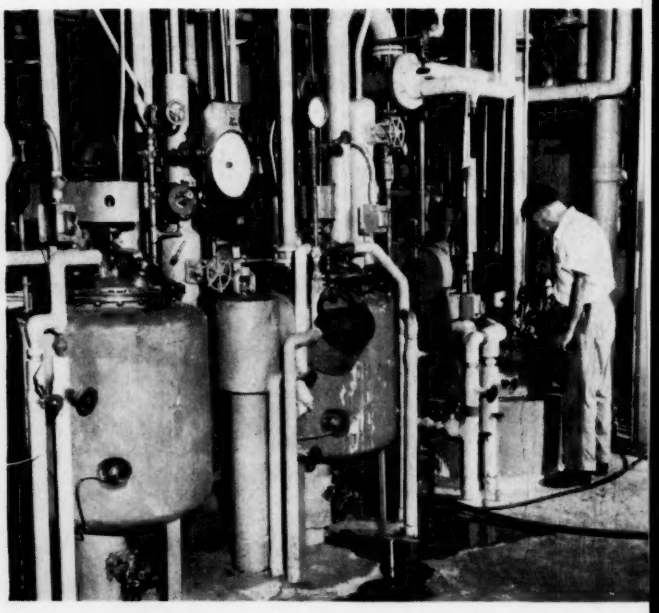
Re-evaluation of Metasap drying (above) . . .



. . . filtration, grinding (below) updates methods.



High-temperature reactors scale-up lab processes.

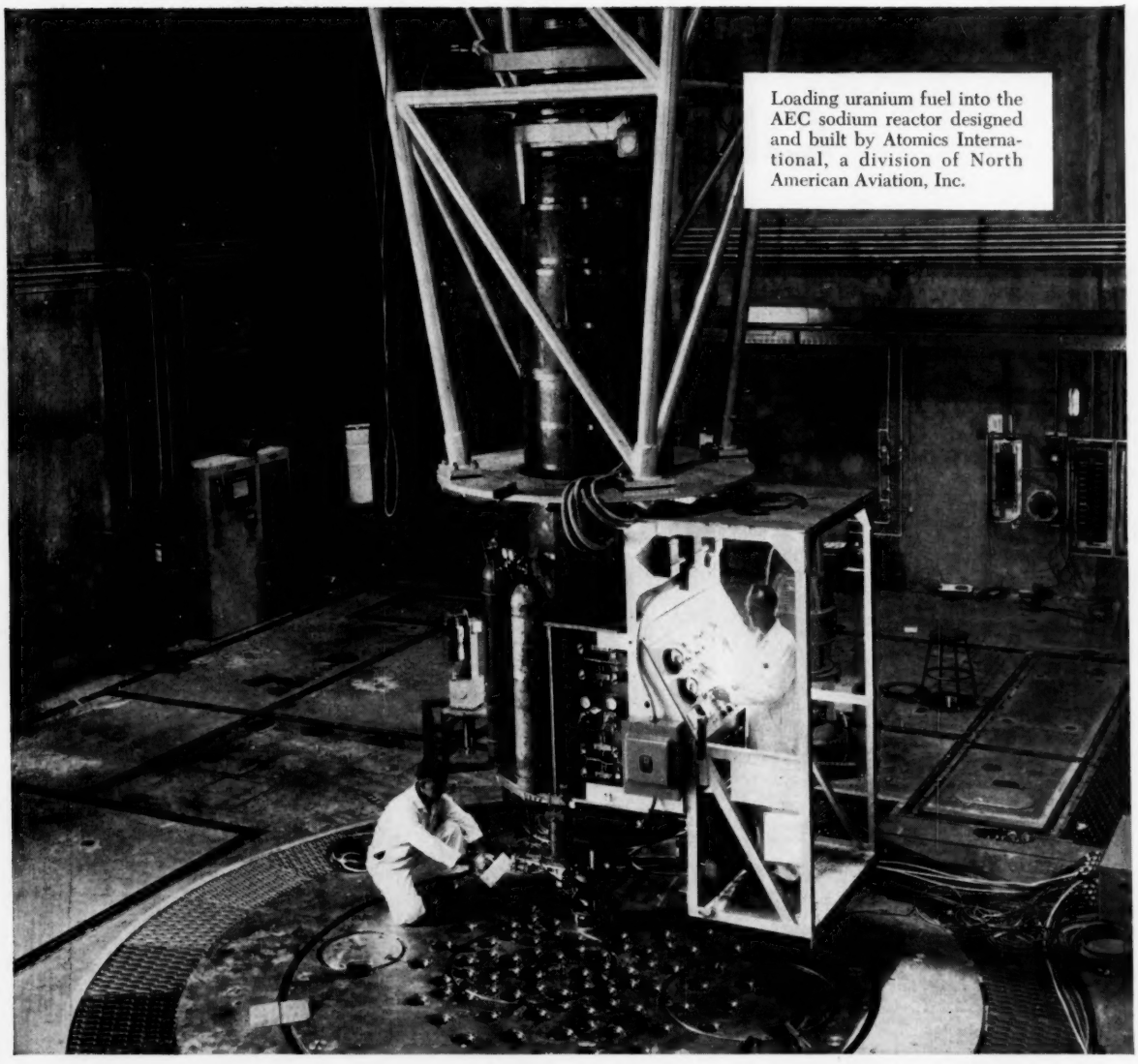
no room for further expansion of pilot-plant work.

Production Arm: With the transfer of responsibility for pilot operations to the production department (directed by vice-president Harry Batley), planning got under way in earnest early in '54. Working as a team, Dick Richter, director of industrial pilot plants, and Dan Muhlmeister, production manager of Nopco's Industrial Division at Harrison, outlined new goals for pilot operation, put engineering plans on paper. Batley supported the plan at the top-management level, secured $375,000 for the new plant.

Given the signal to go ahead, Richter and Muhlmeister tackled the job of cutting the project down to budget. Their first job: finding cost shortcuts that would reduce original estimates; the second: shopping for maximum values in engineering and construction services.

Since the building itself was a major expense item, Richter and Muhlmeister considered carefully every design alternative that would reduce construction costs while retaining maximum functional utility. This called for close cooperation with Engineers Co., Inc. (Newark, N.J.), which translated Nopco's ideas into architectural plans, resulted in trimming the cost of the building from the original estimate of $165,000 to an actual completed cost of $138,000.

Though some structural concessions, such as the elimination of face brick on the rear cinder-block wall, were made strictly on the basis of costs, many were turned to Nopco's advantage. Wooden subflooring, for example, not only cost less than poured concrete but also will simplify future installations that require cutting through the floor. Aluminum windows and porcelainized-steel panels minimized future building



Loading uranium fuel into the AEC sodium reactor designed and built by Atomics International, a division of North American Aviation, Inc.

Water for new Atom Power Plant is 99.999992% pure!

● Southern California Edison Co. . . . now generating current from this new reactor in the Santa Susana Mountains . . . is the first private utility to produce electricity from a non-military reactor.

As in any system using water or steam in or near an atomic reactor, the quality of the water at the Santa Susana plant is important. Suspended and dissolved mineral solids must be removed to prevent them from depositing in boiler tubes and turbines. In other types of reactors, these solids can also pick up and carry radioactivity and could make turbines and other equipment difficult for maintenance or repair.

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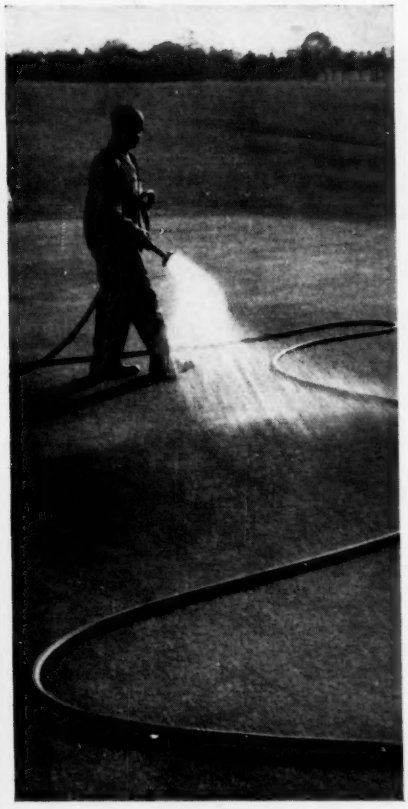

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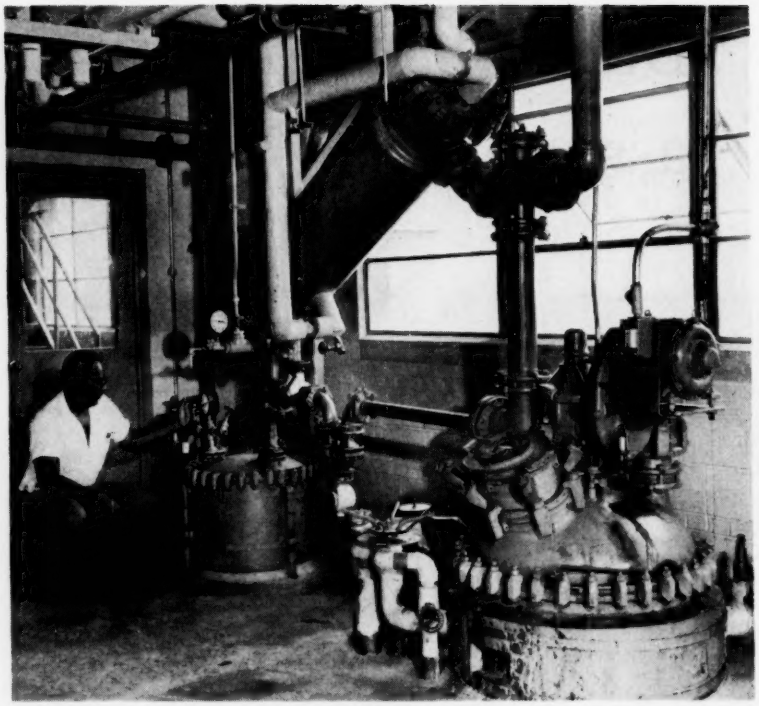
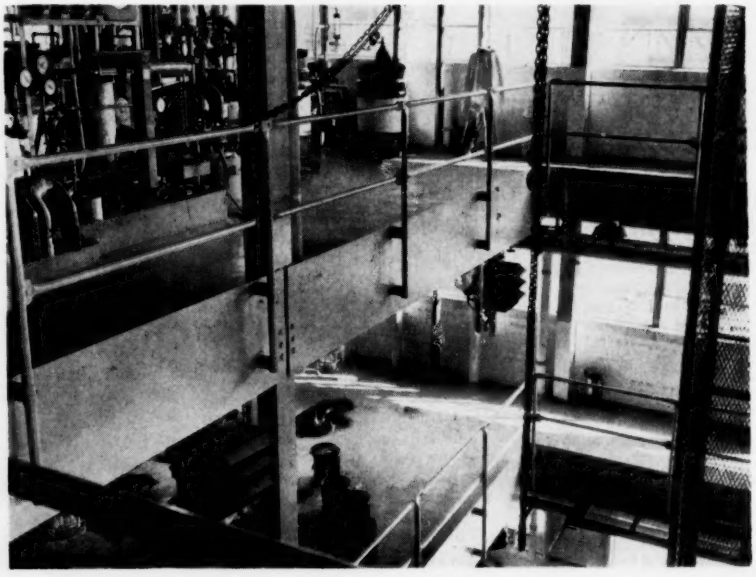


Double-duty units handle semiworks production.

maintenance; Insulrok roofing cost less, is more fire-resistant than wood.

Functional Layout: The physical arrangement of work space and service areas in the new pilot plant were also laid out for maximum operating convenience and safety at the lowest cost. A fireproof wall separating auxiliary equipment (refrigeration, Dowtherm unit, air compressor, vacuum pump, hot water system and electrical service and switches) from the processing area minimized requirements for costly explosionproof equipment. And dusty operations were confined to closed



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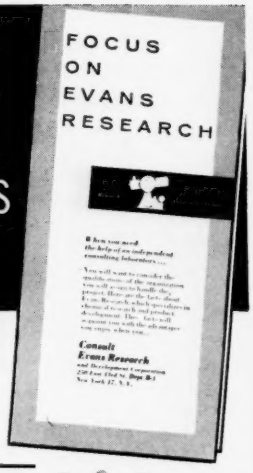

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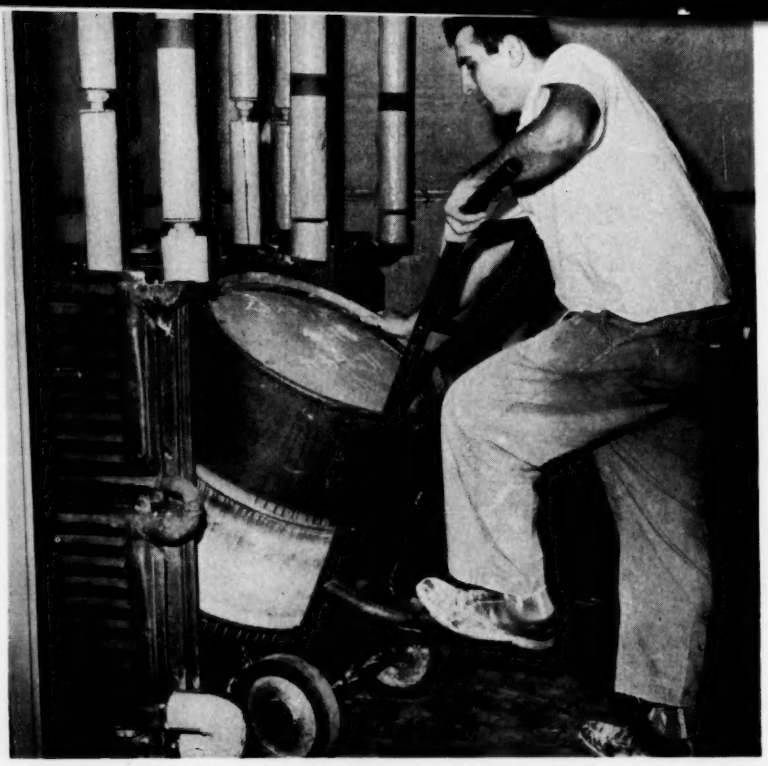
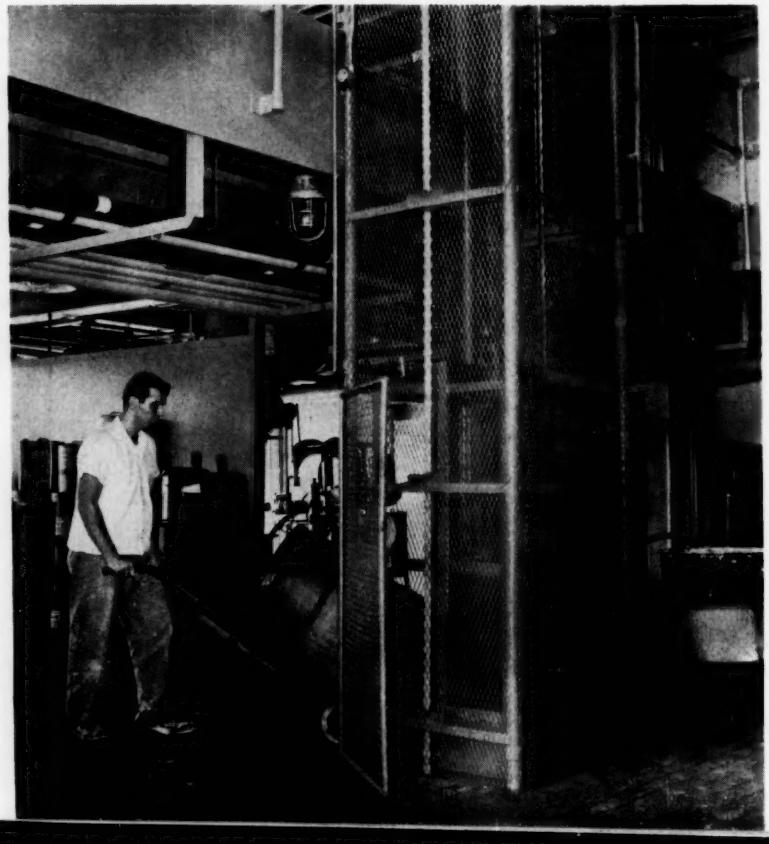


Hot room makes viscous materials easy to handle.

areas to simplify housekeeping, prevent contamination of other processes.

To provide ready access to the upper two floors, Richter and Muhlmeister laid out the work areas on either side of a central well. This open area provides 31-ft. headroom to accommodate columns or other tall processing equipment that may be needed in the future, permits heavy equipment to be raised by an air-operated chain hoist to any level of

Nopco-designed elevator typifies cost shortcuts.



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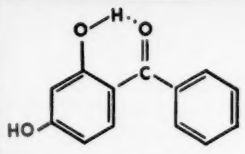
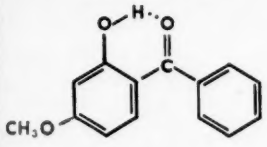
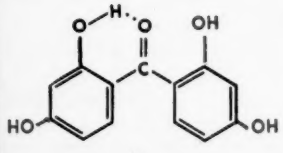
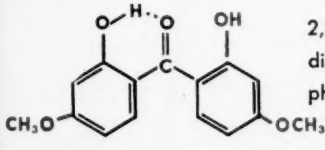
UVINUL 400	 2,4-Dihydroxy Benzophenone
UVINUL M-40	 2-Hydroxy-4-methoxy-benzophenone
UVINUL D-50	 2,2', 4,4'-Tetrahydroxy Benzophenone
UVINUL D-49	 2,2'-Dihydroxy-4,4'-dimethoxy-benzophenone
UVINUL 490	2,2'-Dihydroxy-4,4'-dimethoxy-benzophenone, and a mixture of other tetra-substituted benzophenones.

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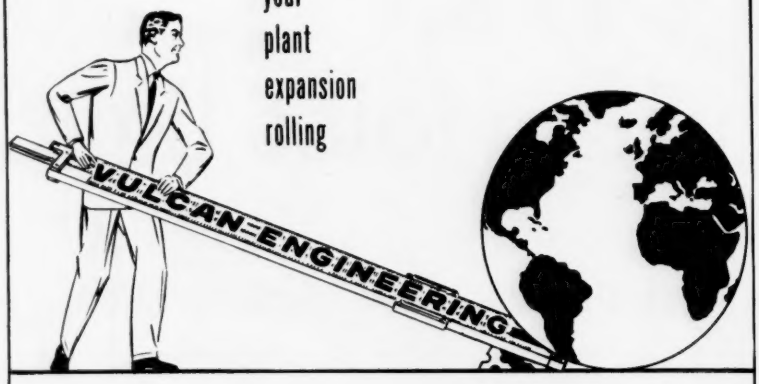

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the building. Another cost-cutting feature of the pilot plant is its functional fire escape. Cheaper to build than an inside stairwell, the outside stairway complies with legal requirements, doubles as a traffic area for operators going up or down between floors.

Equipment was grouped according to function to facilitate familiarization of operators assigned to each area.

And in addition, starting processes were placed on the upper floors to permit downflow of products as they pass from one unit to the next. Materials enter on the first floor, viscous liquids are stored in a hot room to increase their fluidity. Finished products leave the final processing steps on the first floor, require a minimum of handling for packaging and shipment to storage.

To carry the raw materials up to the starting level, Nopco designed an air-operated elevator in the open well. Another example of the company's cost-consciousness, the homemade elevator was built for a fraction of the purchase price of a ready-made unit.

Separate Contracts: Exercising the same careful attention to details of the actual construction work as during the design phase, Engineers Co. shopped around for construction services. In this way, the company reduced piping and electrical installation costs to less than three-quarters of the original estimates, held construction extras down to about $4,000. Total cost for the building, complete with piping, electrical system and finished floors: $227,000.

A good example of the value of sound engineering planning is the piping system in Nopco's new plant. Since many of the lines had to be fabricated of stainless steel, piping was a major expense item, was originally estimated to cost about $60,000. But by designing the pipework as manifold systems, Richter and Muhlmeister eliminated unnecessary duplication of lines, made it easy to tie in additional units with a minimum of new pipe installation. Pressure vessels were also connected (through rupture discs) to a manifold vent system to avoid the expense of venting each unit separately.

Final item of expense in putting the new pilot plant into operation

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Typical reactions of CYANOACETAMIDE

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$$CNCH_2CONH_2 + 2H_2 \xrightarrow{\text{catalyst}} \underset{\text{amide of } \beta\text{-alanine}}{NH_2CH_2CH_2CONH_2}$$

DEHYDRATION

$$CNCH_2CONH_2 \xrightarrow{\text{catalyst}} \underset{\text{malononitrile}}{CNCH_2CN} + H_2O$$

CONDENSATIONS

$$2CNCH_2CONH_2 + \underset{\text{ketone or aldehyde}}{RR'C=O} \xrightarrow{\text{catalyst}} \underset{\text{substituted piperidine}}{RR'CCH(CN)CONHC(=NH)CHCONH_2} + H_2O$$

$$CNCH_2CONH_2 + \underset{\text{diketone}}{RCOCR'HCOR''} \xrightarrow{\text{catalyst}} \underset{\text{substituted pyridone}}{RC=C(CN)CONHCR''=CR'} + 2H_2O$$

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was the purchase of new equipment, reinstallation of old units at a cost of $116,000. Removal and reconditioning of reusable equipment from the old pilot plant, accomplished at a cost of about $6,000, was done gradually to minimize interruption of pilot-plant operations during the move.

Expanded Projects: In full operation since August, Nopco's new plant has already begun to fulfill its expanded role, is currently engaged in several projects that normally fall outside the scope of pilot operations. At the research level, it's exploring new products and processing techniques that can't be studied adequately in bench-scale laboratory apparatus. And at the production end, it's re-evaluating commercial processing methods that the company has employed for many years without a major change.

Finding new ways to make old products better, Richter feels, will be one of the major contributions of the pilot plant. Under consideration: Metasap (metallic soap) processes, sulfonation, emulsification, esterification operations.

An offshoot of process re-evaluation —and one that may very well become an important part of the new pilot-plant's work—is the development of improved processing equipment. In the past, says Richter, the tendency has been to fit a process to the equipment. But with the help of expanded pilot facilities, the company has switched that procedure, now tailors equipment to process needs.

Though the pilot plant must still provide sample quantities of new products, the emphasis now is more on research and development, less on semiworks production. At present, pilot operations are devoted 17% to pilot research, 49% to development (both scale-up of lab processes and re-evaluation of production methods), 24% to sample production and 10% to regular production of intermediates that are too small to be handled in production equipment.

The pilot plant now handles an average of 60-70 jobs/month—many of which involve more than one product. Monthly output of chemical products is down from the '54 average of 25,000 lbs./month, now ranges from 10,000-15,000 lbs. a month.

POINT OF SALE...

FOR CHEM SHOW EXHIBITORS

Be sure...talk business first to the men who make yours...in Chemical Week's new, exclusive November 30th Chem Show Report

WHEN YOU'RE EXHIBITING you want assurance in advance you'll draw top-grade CPI buying powers. That means management (*51% of '55 Show-goers were process executives*) . . . and this, in turn, means CHEMICAL WEEK – the magazine that serves CPI bossmen *in all functions, at all levels.* And here's why CW's Chem Show Report can guarantee the right kind of booth traffic for you . . .

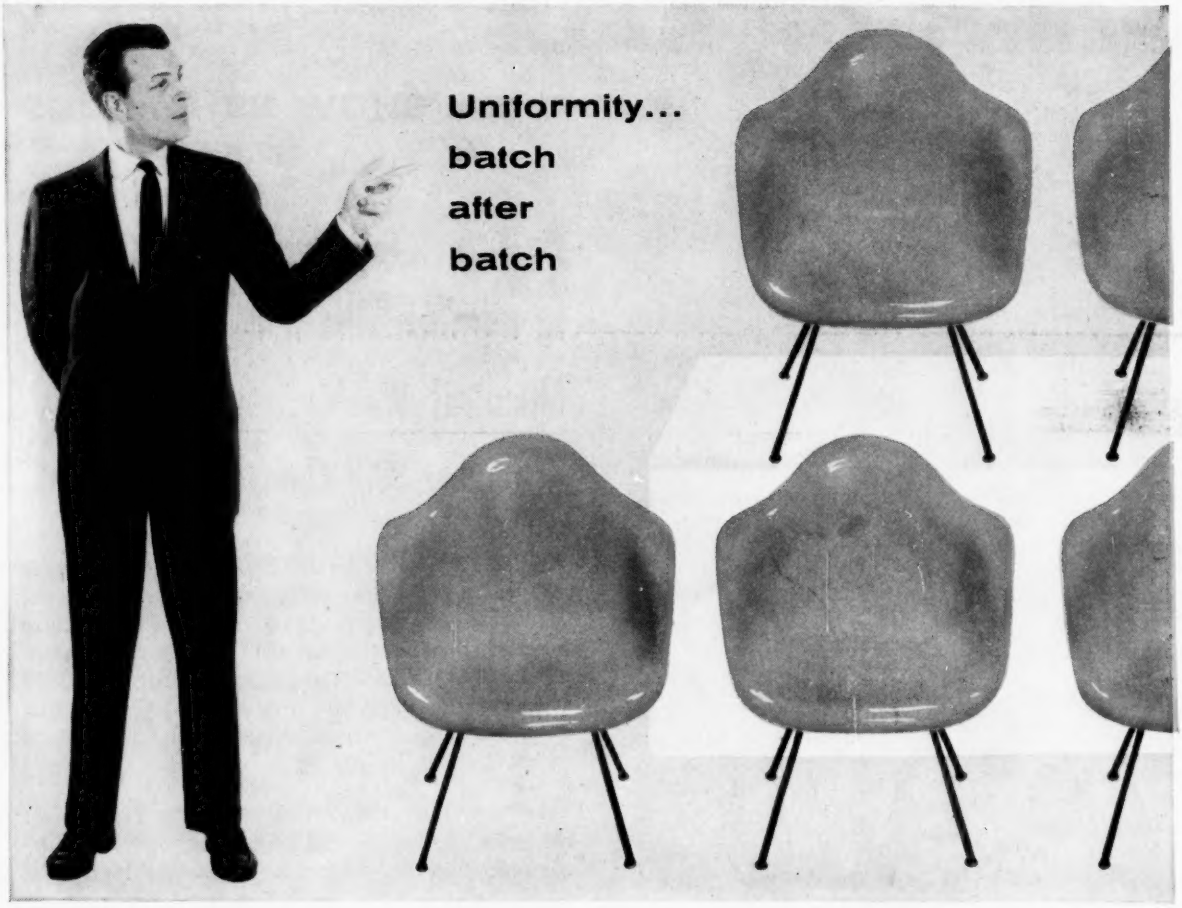
YOU WANT CLASS – NOT MASS! Let's face it . . . everybody's got a "Special Show Issue" or "Program" of some kind. So what makes us so different? First place, this is neither! The "Chem Show Report" is an issue within the regular issue . . . a distinctive insert ⅛" less in trim size . . so bound it can be removed instantly and intact from the rest of the magazine. First page of insert uses CW cover format . . . but illustration and copy is exclusively on the Show. So's the entire editorial content . . . with advertising of exhibitors only . . . *at regular space rates.*

CW MAKES IT EASY for you to flag down prospects here. The unique package compels busy management's attention . . . it has everything a "Show Program" can offer and more . . . the whole theme's pitched on "What to look for at the Show" *before* it opens. Distribution is to entire CHEMICAL WEEK circulation (*36,000 total net paid by issue date*) . . . plus 10,000 additional, to a select group of management buyers on the Convention floor. So why wait? See your CW man *right now*– Get that reservation in *right now* for the . . .

"Chem Show Report" of...

Chemical Week

(Published November 30 . . .
Closing November 13, 1957)



with

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Now available is a new polyester resin grade of diethylene glycol. *This* CARBIDE *diglycol is produced specifically for the manufacture of polyesters and polyurethanes.*

Here are three outstanding advantages of this new polyester-resin grade chemical.

- Narrow boiling range which demonstrates product purity
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These stringent specifications help you obtain uniform batches — time after time.

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CHEMICALS

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Technology
Newsletter

CHEMICAL WEEK
October 12, 1957

The country's first commercial nuclear-power reactor is getting ready to go critical.

Westinghouse completed the last step in assembling the Shippingport pressurized-water reactor last Saturday, when it loaded the core. But final adjustments will take time, and the reactor probably won't start up before next month.

•

A new $750,000 lab to breed disease-free animals will be opened by Imperial Chemical Industries next January. Part of the firm's new research center at Alderly T Park, Cheshire, the new unit will breed 400,000 rats and mice. They'll be kept as germ-free as ICI researchers can make them, then will be introduced to a disease.

The new center will study infectious diseases caused by bacteria and viruses, protozeal parasites and metazol parasites. It will also investigate such noninfectious diseases as cancer, rheumatism, high blood pressure, epilepsy, asthma and hay fever.

•

Phillips Chemical will now sell its linear polyethylenes in four different grades, with varying melt indexes. The resins with higher index show some loss of impact strength and environmental stress cracking.

But the molders' processing time is sharply reduced. And possibly more important, the new grades permit the molding of large items that were not possible to make with the older resin.

•

A drug to combat side effects of penicillin was unveiled at the Fifth Annual Antibiotics Symposium in Washington last week. It's an injectable, purified penicillinase, tradenamed Neutrapen. The drug was developed by SchenLabs Pharmaceutical, a subsidiary of Schenley Industries, and is claimed to be the first known agent to attack the inciting antigens that bring on allergic reactions to penicillin. Other known treatments, says SchenLabs, merely attack the symptoms.

Side effects of penicillin are of increasing concern to drug researchers. In fact, that was the very topic of the keynote speaker of the symposium, Henry Welch, director of the Food & Drug Administration's antibiotic division (*CW, Oct. 5, p. 61*).

•

Vanadium dichloride and vanadium trichloride will be made in a pilot plant now being built by Rocky Mountain Research, Inc. (Denver). The firm has been making the lower chlorides for years—but on a bench scale. The firm expects to make the material available soon in 100-lb. lots. Most likely outlets for the products are as catalysts. Prices are expected to be "in line with those of similar catalysts."

The chlorides will be made by a new process. Although the firm will not disclose process details, it does say that the classical approach —disproportionation of the tetrachloride—is not used.

•

Ethylene oxide vapors can be used to sterilize hospital equipment, says Abbott Laboratories. And that, the firm points out, makes it possible to sterilize plastics and other items that can't stand up to steam or other types of heat for prolonged periods.

Abbott is now using the method to sterilize injection equipment and other equipment right in their cartons. This gives an additional margin of safety, according to the firm. The equipment and the package absorb some of the gas, consequently, a degree of sterilization is maintained for some time.

•

Steel pipe has put on a polyethylene coat. Republic Steel has started production of X-Tru-coat, coated with extruded polyethylene, intended for use by the chemical, oil and gas industries in laying buried pipelines.

As Republic sees it, the new pipe will be able to resist a wide variety of corrosive conditions and will still have the strength needed for safety—and then some. It feels that the new pipe may reduce buried pipeline corrosion, which now costs industry several hundred million dollars annually.

•

Koppers and Strategic Metals have signed a "working agreement" to push processes now under development by Strategic at its lab and pilot plants in Niagara Falls, N. Y., and in Canada.

One of the brightest hopes in Strategic's chest is the ferromanganese process of Marvin Udy (*CW, Feb. 9, p. 40*).

•

A silicone-containing insecticide was revealed at a meeting of the Hans Fischer Society in Germany recently by Siegfried Nietzsche, of Wacker-Chemie GmbH. (Burghausen). Wacker-Chemie (like the other two German silicone producers) makes the silicones under license from Dow Corning. It forms a silicone-carbon bond by reacting a silicone containing one hydrogen with olefinic derivatives.

•

Sweet-sounding chimes have replaced a blaring horn to warn operators of trouble in a Dow Texas Division plant. Chimes are used only in the relative quiet of the control room, however. Horns still have a job in other parts of the plant because of the need to overcome competitive sounds of turbines and to carry longer distances.

Every make will have RAYON TIRES

Modern rayon tires are the result of years of intensive research by the manufacturers of tires, tire cord and cellulose. Buckeye was the first to supply cellulose, basic raw material in rayon tire cord.

THERE's a story behind this headline that will interest any user of chemical cellulose.

Many millions of tires ago, Buckeye was called on to supply the first cellulose for use in original research on rayon tire cord. Our technical staff worked hand-in-hand with the pioneers in this field. We rejoiced with them when tires with rayon cord first rolled off the production lines and onto the nation's highways to start a new era in tire performance, safety and economy.

This was only the beginning . . . for rayon tire cord has been steadily improved year after year. In the past 5 years, for example, its flexing quality has increased 60%; its strength more than 50%. These are just two of the reasons why rayon tires are the overwhelming choice of every car maker for 1958.

Refinements in rayon tire cord have been accompanied by the development of higher qualities and increased supplies of Buckeye Cellulose. Other products using cellulose have also benefitted from Buckeye research and customer service. We are ready to serve your company . . . just call on us.

Buckeye
first in cellulose

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Cotton linters plant at Memphis, Tenn.—Wood pulp plant at Foley, Fla.

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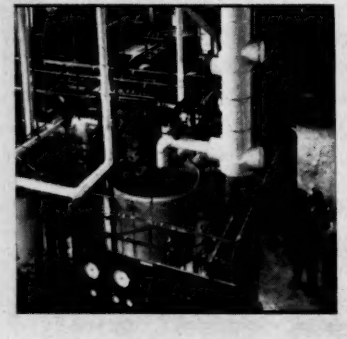
HERE'S THE MHI CUSTOM REACTION PLANT



HERE ARE TYPICAL CUSTOM REACTIONS

now being carried out for others

- Lithium aluminum hydride, sodium borohydride, potassium borohydride reductions, including those involving the use of metal halides.
- Sodium hydride condensations, alkylations, and cyclizations.
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- Preparation and in situ use of Grignard reagents.

HERE'S AL HINCKLEY FOR INFORMATION

CHEMICAL HYDRIDE DIVISION

Metal Hydrides Incorporated

PIONEERS IN HYDROGEN COMPOUNDS

CONGRESS STREET • BEVERLY, MASSACHUSETTS

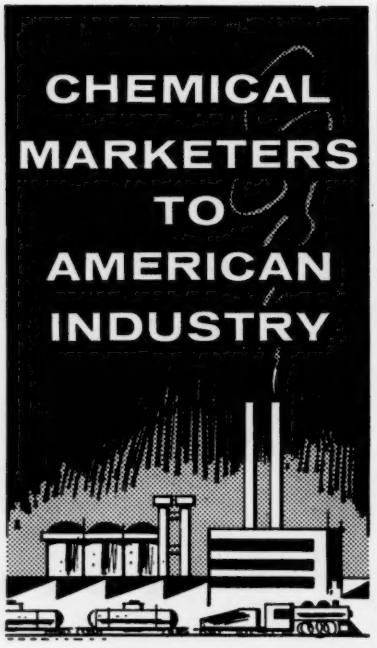
Supermarket bleach sales are still dominated by liquids. Makers wonder if there's . . .

Space on the Shelves for Dry Bleaches?

In Charleston, W. Va., Westvaco division of Food Machinery and Chemical Corp. will build a 6-million-lbs.-a-year chlorocyanuric acids plant; operational date: July '58. In Everett, Mass., Monsanto is readying a "multi-million"-pounds-a-year chlorocyanuric acids plant. It's due in production within two weeks.

These developments are currently giving laundry specialties makers cause to ponder. Though dry bleaches, so far, have made only a trifling impact on the household bleach market, these two plants, when in full operation, will be capable of turning out up to 10 million lbs. of products that have household and industrial dry bleaches as their major market. Clearly, at least two market-wise chemical firms are betting plenty that solids will realize their big potential in the $115-million/year home-bleach field.

There's apparently a calculated risk in Westvaco and Monsanto putting all this production onstream, but two speculations might help dispel the eggs-in-one-basket aspect of their maneuver. One is that the plants can be easily switched to polyurethane making; the other is that a new (but still secret) application for the cyan-



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urics is about to make its debut.

Right now, of the half-dozen firms currently marketing them, only Purex Corp., Ltd. (South Gate, Calif.), can claim really substantial sales for dry bleaches. Purex markets both its liquid and dry bleach products to the same outlets. In none of its marketing areas, reports the company, does the dry outsell the liquid product. The company compares the situation to that obtaining with instant coffee when it first got started: the public was at first cautious about taking a chance on a new product.

Currently, Purex is turning out some of its product with DDH (dimethyldichlorohydantoin) some with dichlorocyanuric acid.

Stability of the cyanuric-based product apparently is giving Purex something of a problem. This conclusion stems from the observation that the company is not only packaging some of its dry bleaches in glass jars but also uses a cardboard package with both asphaltic and foil wrap.

Colgate, the firm formerly expected to strongly push its dry bleach, Pruf, has withdrawn it entirely—with a curt explanation of "unsatisfactory sales." Lever claims not to be considering a dry bleach at this time.

Linco Products (Chicago) reports that sales of its dry product are "fully up to expectations"—but admits that its own liquid bleach outsells its 10-month-old dry by about 10 to 1. And Hilex Co. (St. Paul, Minn.) agrees that, though its liquid moves in greater quantity (also a 10-to-1 ratio), its solid bleach sales are climbing as consumers become familiar with it.

Second Wind? Wyandotte and Monsanto* obviously feel that ready availability of the chlorocyanurics will further brighten the picture. So far, the heavy-duty dry bleach market has been dominated† by materials based on dimethyldichlorohydantoin, a compound introduced by Wyandotte Chemical and now available from it and from Wymat Chemical (Kearney, N. J.). Wymat also makes the chlorocyanurics.

Monsanto and Westvaco, in pushing the cyanurics, are counting on the still-debated advantages of the chlorocyanurics—better solubility, better bleaching effects—to overcome a substantial, and nondebatable, price disadvantage. DDH now sells for 40¢ a pound; current users of the chlorocyanurics pay 75¢/lb. — although new production facilities may bring this down to 65¢/lb. soon.

Triple Threat: Several forms of chlorocyanurics are now offered. Trichlorocyanuric acid (TCCA or TCA), with 85% available chlorine, was first put on the market late in '55. It seems to be favored for industrial bleach products. Dichlorocyanuric acid (DCA), providing 70% chlorine, now gets the nod in home bleaches because of its greater stability. Westvaco is offering a sodium DCA, which it claims has a high solubility advantage, combined with good stability.

As producers of DDH are quick to point out, the chlorocyanurics have not been so thoroughly market-tested in formulations as has DDH.

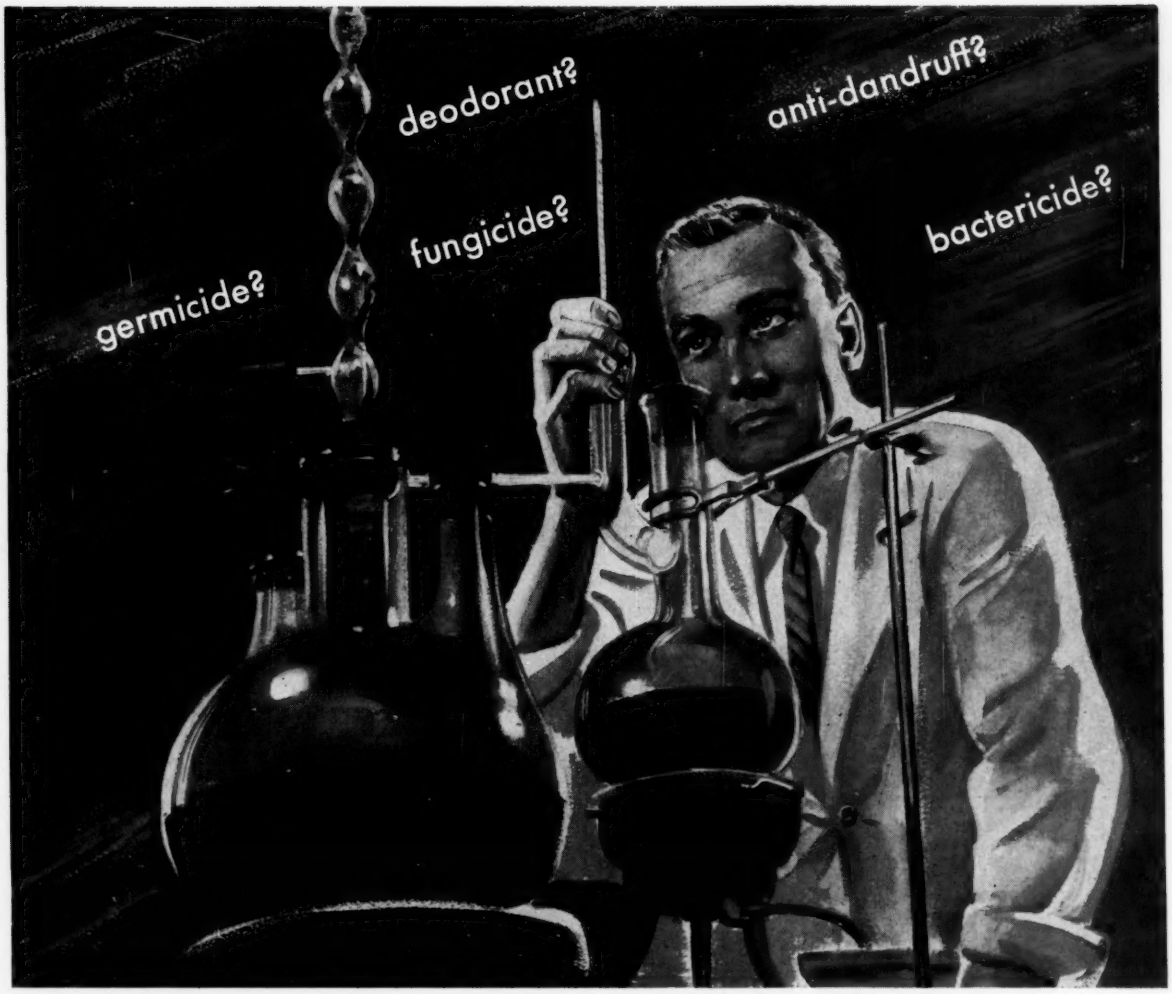
DCA has shown up in other kinds of consumer products besides bleaches. It is the bleach component in several of the leading scouring powders. Such powders, of course, can never become as large a market as the home bleaches—even if the entire U.S. output of 550 million lbs. of cleansers were formulated with DCA. In such an unlikely case, there would only be a demand for about 2.5 million lbs. of DCA.

Liquid Assets: Aside from the internecine fight between the chlorocyanurics and DDH, there is the problem of dislodging the liquid heavy-duty bleaches from their firm market perch. The liquids, familiar to the housewife, easy to manufacture, effective and cheap, are tough opponents.

There's this, though: because they're bulky and heavy, the liquids are seldom sold more than 100 miles from their manufacturing point—a fact that has put many small laundry specialties makers in business and increased competition. This competition has driven the price down to the point where grocery men report liquid bleaches are among the lowest-mark-

*American Cyanamid is another firm interested in the fate of the cyanuric derivatives. It is making small lots of cyanuric acid itself now, and, if the market warrants it, may build a $5-million plant for production of the acid within the next two or three years.

†Often overlooked in discussion of dry bleaches is the fact that lithium hypochlorite, though not discussed as a bleaching material as much as it was back in the '40s, is still very much in the picture. One dry bleach maker is convinced this is the material he'll eventually be using, cites price (there are no commercial producers) and hygroscopic difficulties (due to lithium chloride) as the reasons he's not using it now. The available chlorine (121.4%) in the material makes it promising, and some day Solvay, Pittsburgh Plate Glass, Wyandotte and others may cash in on the patents they hold in the field.



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Please send:

☐ Sample ☐ Bulletin 116C ..... on VANCIDE 89RE

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(Please attach to or write on your company letterhead)

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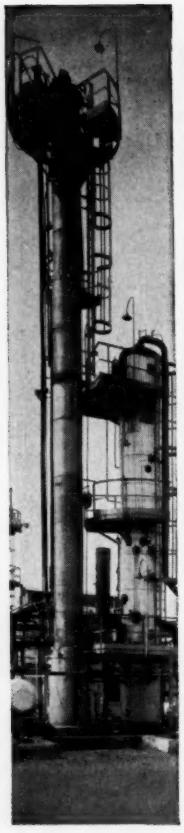

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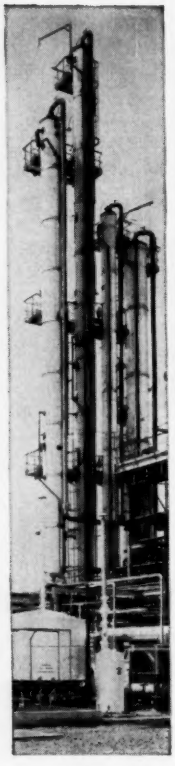
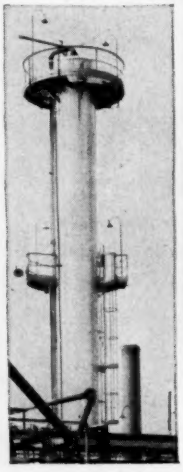
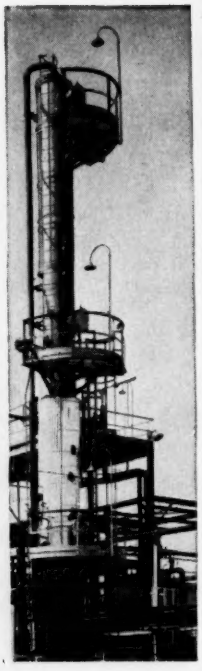


*The first completely continuous processing plant for cresylic acids, cresols and phenols.





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up items on their shelves.

Solid bleaches, with the price more readily determined by the maker, are actually more profitable than liquids, in spite of high component cost and the frequent need to turn to a contract packager for help. Further, the solids are cheaper to ship, to store, to handle. There's little question why makers of chlorinating agents feel there's a big market ahead if they can just get consumer acceptance.

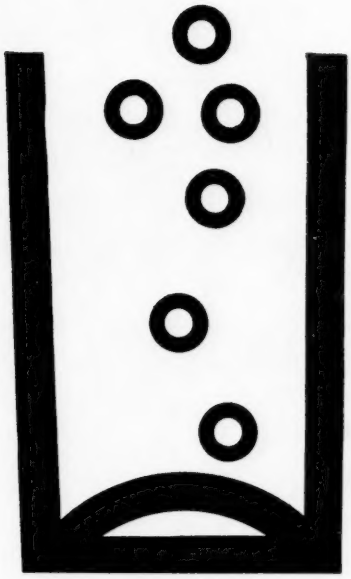
Marketer's Meat: From a sales point of view, the solids have novelty, convenience, safety and effectiveness. It is becoming apparent, however, that the job of re-educating a housewife to the advantages of solids is a slow one—perhaps too much so for the small specialties man.

Big Drive Coming? Dry bleaches might be put over with the sort of merchandising program typical of soap selling. Procter & Gamble, which recently acquired Clorox, is the most likely candidate. At least one observer figured Clorox would be in the field already if it hadn't been occupied with the problems of an ownership change.

P & G-Clorox told *CW* that it has not, so far, test-marketed any dry bleach with either DDH or DCA—but, of course, that doesn't rule out a move in the near future. Makers of raw materials are convinced Clorox must eventually sell dry bleaches. When—and if—Clorox does move, it will likely touch off the two real battles—over the choice of chlorine component for dry bleaches, and between the small maker of liquid bleaches and the larger firm selling solid bleaches. Such battles will result, most certainly, in a completely altered household bleach market picture.

Fiber Drums for Liquids

Liquid and semiliquid products can now be transported in a new fiber drum introduced by Continental Can. Called Liquipak fiber drum, the container has a polyethylene lining, heavy-duty electrogalvanized top and bottom chimes, and either a vinyl- or epoxy-coated metal cover. Tare weight of the unit is 24 lbs. Among potential applications: packaging of wetting agents, soap and detergents, vat dyes, liquid chemicals and pharmaceuticals, synthetic resin emulsions, phosphoric acid and metal cleaners.



1.

PFIZERIDDLES

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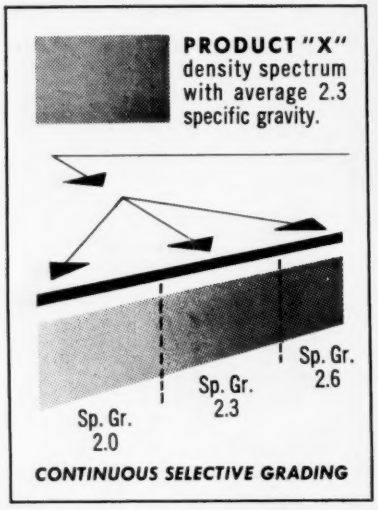

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SEPARATIONS

Dip coating is replacing the spray gun at American Motors.

New Route for Rust Drive

American auto manufacturers are going all out to protect the family buggy from rust. Both American Motors and Lincoln have just switched to a dip-painting process for applying rust-preventing primer to '58 auto bodies. Previously, the primer had been gun-sprayed on accessible areas, leaving most of the inner panel surfaces unprotected.

The American Motors installation *(shown above)* is estimated to have cost the company $400,000, is 91 ft. long, 7½ ft. wide, 6 ft. deep. It holds a working load of 15,000 gal. of Ferrochrome, a red-oxide alkyd fortified with zinc chromate (made by Pittsburgh Plate Glass Co.). Each car body uses approximately 2 gal., considerably more than the amount required by former methods. The Ferrochrome is refrigerated to 40 F for viscosity and fume control.

Designed primarily to permit coating of inner surfaces, the bath does not appreciably speed over-all painting time. Nor has it meant any change or saving in application of the regular prime coat or the two finish coats. In addition, AM still subjects the "body-in-white" to a bonderizing process before dipping. The unit at AM's Milwaukee plant has been in operation since mid-August, when the company started production of '58 models. Another unit is being installed in the Kenosha, Wis., plant, where bodies for the new 100-in. wheel-base cars will be made.

Lincoln's installation at its new Wixom, Mich., plant is somewhat smaller than AM's, measures 69½ x 9 x 4 ft. and holds 10,000 gal. of water-emulsion paint. As in the AM unit, the tank can be drained in less than four minutes in an emergency. The areas are, of course, thoroughly ventilated even though workmen are not present except for periodic checks.

Dip painting is more applicable to unitized bodies, which, due to their inherent structural strength, can be handled by overhead conveyor without damage. Although new to the U.S., the dip idea didn't originate in this country; several European auto manufacturers use dips throughout the painting sequences.

Pitch for Polish

National Starch Products (New York) is going after floor polish business with a new resin emulsion called Resyn 25-2400. Based on a vinyl, the new emulsion is said to impart high gloss, to have excellent resistance to wear and scuff and good water-spot resistance. Other claims: self-polishing and rebuffable polishes made with Resyn are not tacky, produce no color change on light or

QUIZ

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2 Is your bag properly constructed for your product?
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4 Is the total cost of your bag out of proportion to the selling price of your product?
5 Does your product cost warrant redesigning your bag to merchandise your product more effectively?
6 Are you using the most economical filling machine available for packaging?
7 Are your current suppliers giving you the service you desire?
8 Are your suppliers integrated and capable of maintaining dependable service at all times, under all conditions?
9 Are your suppliers' representatives qualified to help you with your packaging, sales promotion and marketing?

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- Kraft Bag Corp.

☐ O.K. Kraft... Help me to answer your Quiz. Please have representative call.

COMPANY_____

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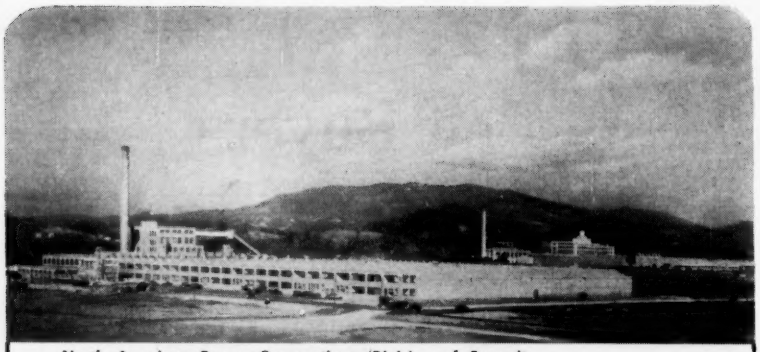
PRODUCT MFD_____ NAME_____



North American Rayon Corporation, (Division of Beaunit Mills, Inc.), Elizabethton, Tenn. One of the large and successful units in the industry, this plant produces viscose process rayon yarn. A few years after the original construction, the plant was doubled in size to a total floor area of 1,000,000 sq. ft.

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white surface, and are completely nonyellowing.

Floor polish formulations require, in addition to the resin, a wax emulsion and a leveling agent. **Resyn 25-2400** is compatible with emulsions of carnauba, polyethylene, microcrystalline and Fischer-Tropsch waxes. It's also compatible with such modifying resins as Shanco, Durez, Picopale, and Pentalyns that are alkali-soluble or dispersible.

Polishes made with the National Starch resin are said to be applicable to linoleum, linoleum tile, asphalt tile, vinyl tile, rubber tile and many other synthetic floor coverings.

PRODUCTS

Gold Vehicle: Pennsylvania Industrial Chemical Corp. (Clairton, Pa.) has developed a new modified styrene resin for use in gold vehicles. Called Piccolastic, the new resin is said to be completely neutral and unreactive, stable to heat and ultraviolet exposure.

•

Can Liner: Barrett's new 3725 phenolic resin, for use in can linings, is said to resist acid more effectively than materials currently in use. Price is said to be about 25% lower than that of the closest comparable product.

Immersion for 60 days in concentrated sulfuric acid and in 5% sodium hydroxide solution had but minor effect on the surface of the material.

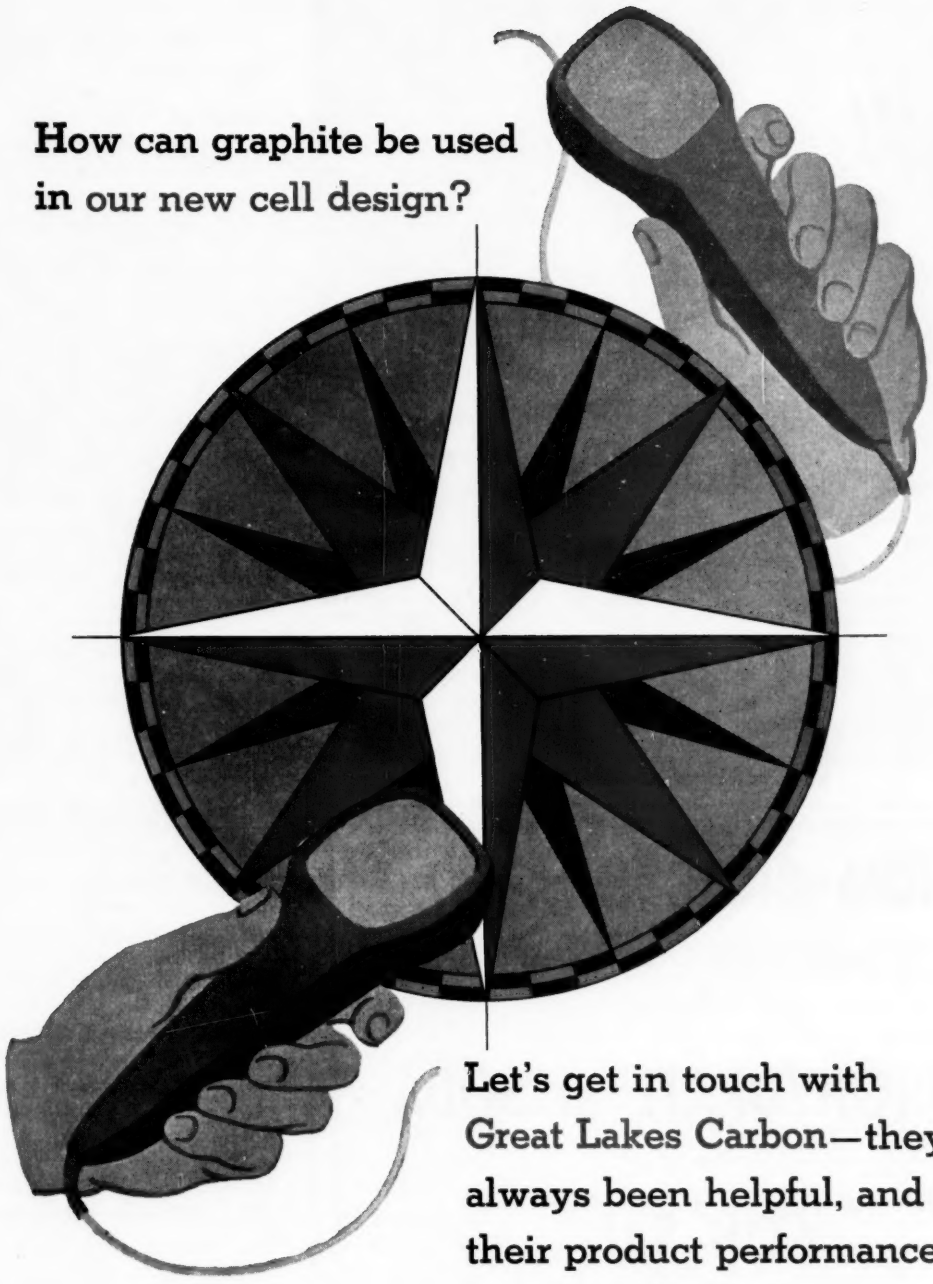
•

Potato Starch Goes Commercial: Amylose and amylopectin, the principal components of potato starch, are now commercially available from Stein Hall and Co. (New York). Stein Hall imports the starches from AVEBE (Veendam, Netherlands), has acquired exclusive sales rights in the U. S. and Canada. Amylose, to be marketed under the name Superlose, is expected to find use in textiles, paper coating and packaging films. Ramalin, tradename for amylopectin, can be used in textile sizing, paper sizing and as a suspending agent in the food field.

•

Paint Vehicle: Reichhold Chemicals, Inc. (White Plains, N.Y.), has a new water-thinnable alkyd paint vehicle that gives gloss architectural finishes comparable to those obtained with solvent-thinned paints. The vehicle, tagged 1505 Synthemul, is said to offer

How can graphite be used in our new cell design?



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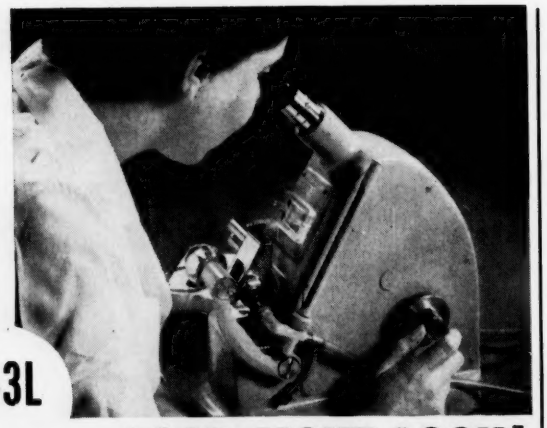

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Sugared Weed Killer: Marathon Corp. (Rothschild, Wis.) is now offering Maracarb X-1, a weed killer comprising a complex mixture of the lower-molecular-weight salts of lignosulfonic acids, and the salts of alkaline reversion products of hexoses and pentoses.

•

Nondrip Can: Stanley Home Products (Westfield, Mass.) has just added to its line of household products a liquid-silver polish in a nondrip, plastic-spout can.

•

Bottle-Washing Additive: United Chemical Corp. (Providence, R. I.) is offering an organic sequestering agent, Extend-R, for caustic bottle-washing solutions.

•

Silicone Rubber: Dow Corning has a new room-temperature vulcanizing silicone rubber, Silastic RTV 501, for encapsulating electric and electronic parts and for general potting, sealing and caulking applications. Vulcanization takes place within 24 hours at room temperature and the compound is completely stabilized after 48 to 72 hours, Dow Corning says. The material may be mechanically or manually mixed as long as three hours before application. Recipe: 25 parts of rubber to one part catalyst, by weight.

•

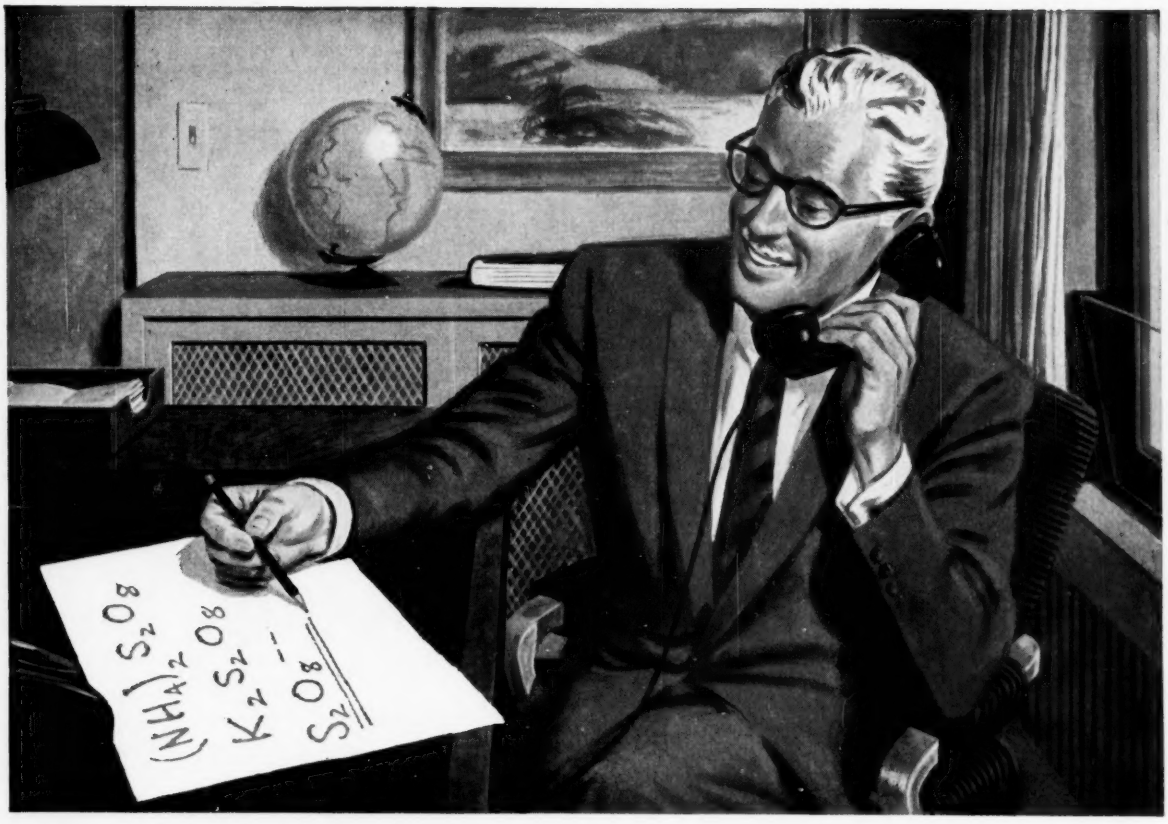
Smoother Braking: Chrysler Corp's. '58 cars and trucks will have a new heavy-duty brake fluid. Tagged Mo Par Hi-Temp, the fluid is said to provide efficient brake operation over an exceptionally wide range of temperature—from 60 below zero F to 400 F. Minimum boiling point: 390 F.

•

Liquid Paint Stripper: Cleanite Products Inc. is offering a fast-acting liquid paint stripper, Cleanite 56, for lacquers, vinyls and baked enamels. The solution does not require heating.

•

First Canadian Plant: Pennsalt Chemicals Corp. has chosen the site of its first Canadian plant, a 10-acre area near Oakville, Ont. First product lines will include metal processing chemicals, sanitizing agents and dry-cleaning chemicals. Completion of the new unit is scheduled for Dec. '57.



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You'll find persulfates have particular values in processes involving emulsion polymerization of monomers and depolymerization of organic polymers. Persulfates excel in such applications as processing color films, etching printing plates, and modifying starches; and are of interest as reactive oxidizing agents for many other purposes.

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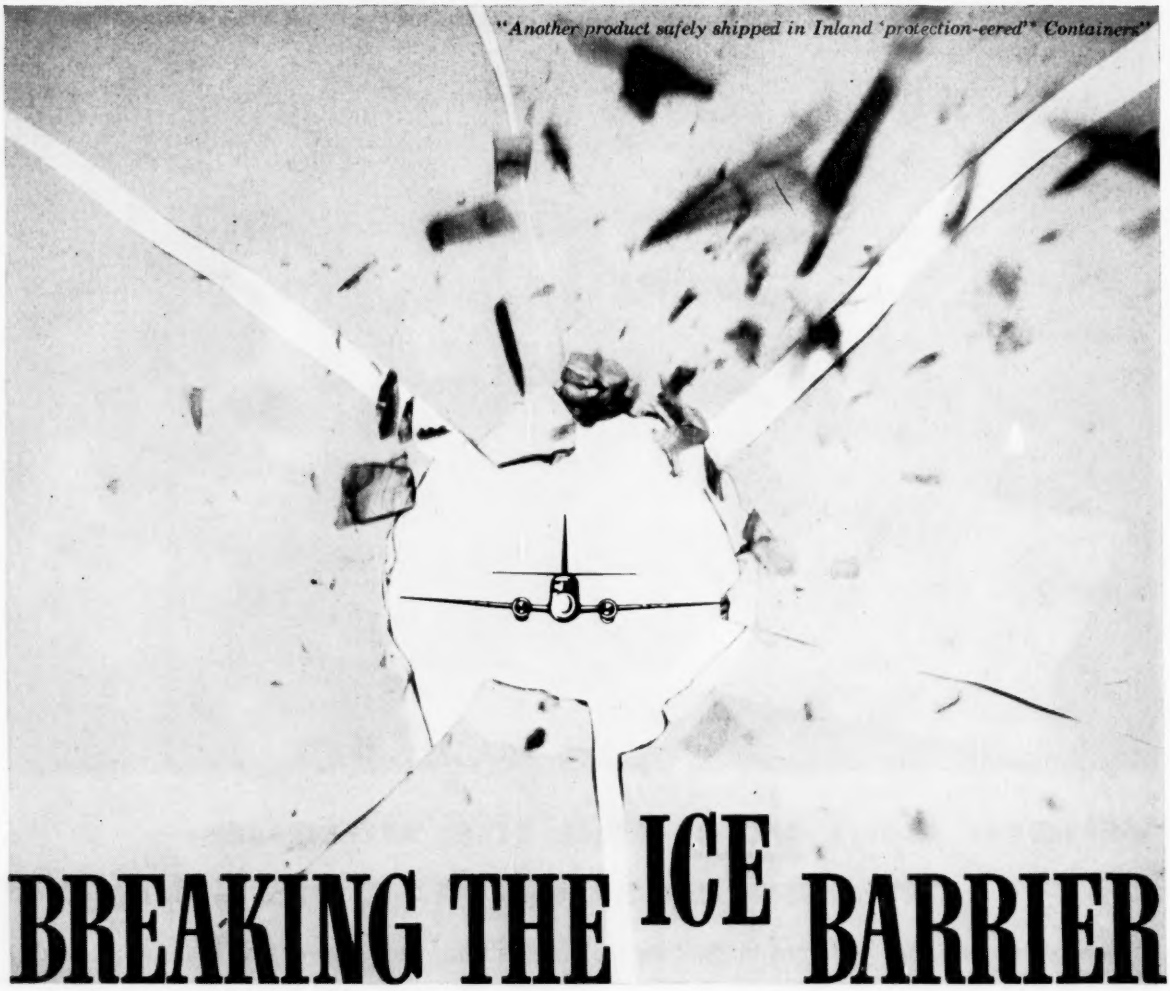


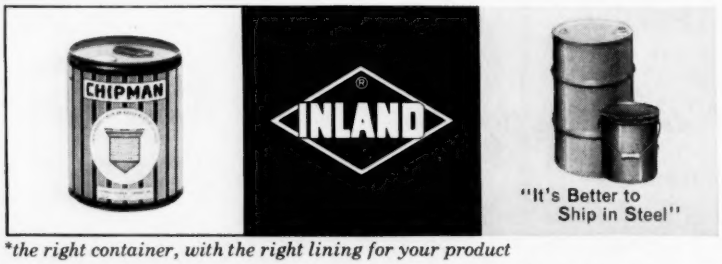
BREAKING THE ICE BARRIER

Ice on airliner wings is dangerous. To eliminate this hazard, *Kilfrost* TKS R328 wing de-icing fluid, made by Chipman Chemical Co., Inc., is extensively used for both commercial and private airplanes. The fluid is circulated through a honeycomb surface along the wing's leading edge. The flow of Kilfrost over the wing's surface, controlled by the pilot, forms a film that dissolves ice on contact—preventing its formation in flight.

Foreign particles in this fluid, however, could clog the honeycombed surface, jamming the circulatory system. Kilfrost has to be delivered in perfect condition, pure and contamination-free.

Various types of packaging materials were tried but the abuse received during shipment caused leaks at corners and seams. So Chipman and Inland made exhaustive tests and found the answer in a sturdy Inland steel pail with a special protective lining. Now Chipman has a package they can depend on to deliver Kilfrost safe, uncontaminated, ready to break the ice barrier.

Wherever *your* products are used—land, sea or air—if packaging is a problem, Inland Steel Container is ready to help you. Write Bob Boecher, Dept. 334A.



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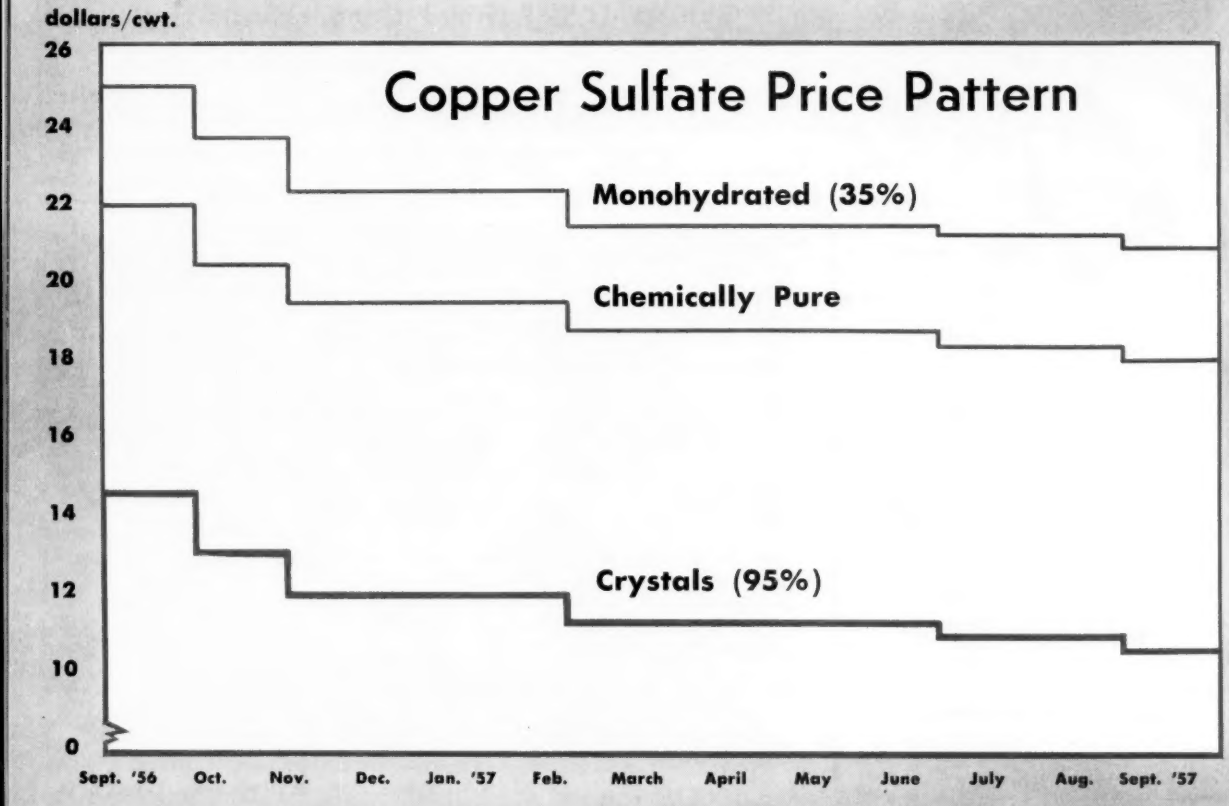


Copper Industry Steps Down to Soft Market

The recent upturn (to 26¢/lb.) in smelter prices is being pegged in some quarters as the end of the nose dive that has brought copper to its lowest level in more than four years, and—over the past year or so—has consistently depressed prices of just about all copper-derived chemicals. Typical: the downward pattern of copper sulfate (see above). But optimism is by no means widespread.

Still present, declare many trade followers, are too many factors that drove smelter prices from a sky-high 55½¢/lb. in the spring of '56 to 25¢ earlier this month, and chopped primary producers' tags from 46¢/lb. to 27¢ in the same period. Most important: copper capacity will continue to be far in excess of demand; competition from low-cost foreign production is still rugged.

Chemical Impact: Copper sulfate is usually the first of the copper chemicals to feel the effects of the metal's market gyrations. In July of last year, for instance, shortly after primary producers' prices broke sharply (6¢/lb.) from the previous 46¢ level, marketers slashed schedules on all types of sulfate.

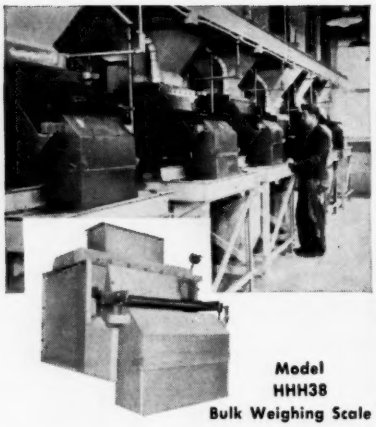
Crystal prices were cut $1.50/cwt. (c.l.) to set a $15.20/cwt. price; tribasic dropped $3.20, to $32.65/cwt.; and monohydrated went down $2/cwt., to $25.

In the series of declines suffered by sulfate in the last 12 months (*see above*), prices on chemically pure material have settled at $18.45/cwt.; crystals (99%), at $11.55; monohydrated at $21.15/cwt.; tribasic, $25.45 a cwt. to distributors. Down, too, in a round of August cuts, were copper carbonate (55%), black and red copper oxides, copper chloride anhydrous and crystals. And again a couple of weeks ago, the carbonate was shaved an additional 0.006¢/lb., oxides, 1¢/lb.

Last month, copper hydrate underwent its second-in-a-month decline, to a c.l. drum price of 48¼¢/lb. (freight allowed, east of the Mississippi). There have been reductions in the price of other copper chemicals (e.g., cyanide, nitrate); but those cited above illustrate—as one seller describes it—"the sad state" of the copper—and copper chemicals—market.

No source of comfort, either, is the slack-off in agricultural consumption of copper sulfate. Thanks to drought in many sections of the country, particularly in potato-growing areas, most sellers have written off the agricultural season demand.

Except for a fillip in '55, sulfate production in the U.S. has generally been scaling lower. Note these comparative output figures over the past few years:



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Salient U.S. Refined Copper Statistics*

(thousand tons)

	1953	1954	1955	1956	Estimated 1957
Production (from U.S., foreign ores)	1,293	1,212	1,342	1,443	1,500
Net imports (I), or net exports (E)	165 (I)	1 (E)	2 (E)	31 (E)	115 (E)
Producers' stocks at end of previous year	26	49	26	34	78
Total supply	1,484	1,261	1,369	1,445	1,463
Apparent consumption	1,435	1,235	1,335	1,367	1,200
Producers' year-end stocks	49	26	34	78	263

*Based on government data and industry estimates; production data does not include secondary copper refined by primary or other refiners.

U.S. Copper Sulfate Production

(gross weight, thousand tons)

1951	106.9
1952	94.5
1953	72.9
1954	65.3
1955	78.1
1956	66.8

Production for the first seven months of '57 came to some 45,000 tons, but chances are the year's total will be only slightly higher than that of '56. And sellers, at the moment, aren't at all hard pressed to fill any copper sulfate orders. It's a direct reversal of the tight market prevailing just a few years ago (*CW, March 12, '55, p. 85*).

Copper Blows: Not for years has copper supply so outpaced demand. To ease the supply/demand imbalance, Phelps Dodge has trimmed production at its open-pit mining operations in Arizona by some 1,250 tons/month. The curtailment is the third in a year for Phelps Dodge (second largest copper producer), brings the company's total production cutback to about 3,500 tons/month.

Anaconda has reduced monthly domestic output by more than 2,400 tons; Kennecott Copper (the world's largest copper producer) suspended operations at its Chino Mine (Hurley, N.M.). The latter shutdown was reportedly to make repairs, but the end result was a further 2,200-ton cutback in U.S. copper production.

This month, Kennecott, reportedly, will close its Ray Mine Division in Arizona for two weeks, also for repairs. The Ray Mine has been producing at about 4,500 tons/month; thus, the shutdown may mean close to 2,000 tons less copper.

Smaller producers have also shaved production schedules by a total of an additional 1,450 tons/month, and the pricing situation could spawn more shutdowns.

Current reports indicate that curtailments here and abroad now total more than 150,000 tons/year. This compares with an excess of refined world output over deliveries (to fabricators, copper's chief outlet) of slightly more than 154,000 tons in '56, and 109,000 tons through Aug. '57.

Who's to Blame: The present unhappy state of the copper industry, in the U.S. at least, is being blamed on earlier government policies (*CW, Oct. 5, p. 68*). Fearing a copper shortage of long duration, defense planners encouraged domestic (and foreign) mining companies—via loans and floor-price contracts—to open new properties and to expand production of old mines.

This encouragement, plus high

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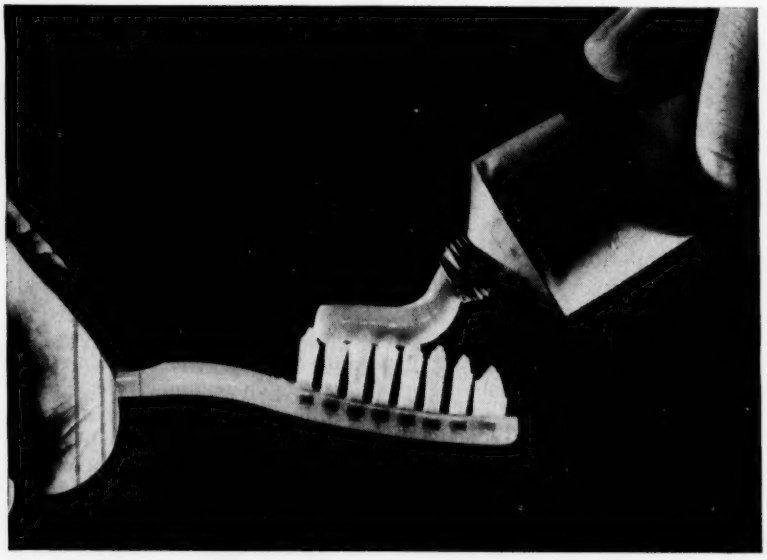

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Perhaps your product, too, could profit from including SORBO for its many inherent advantages as a humectant or softener. Besides toothpaste, SORBO is used extensively to give superior qualities to such products as candy, cosmetic creams, cough syrups, tobacco, cork and adhesives, to name a few.

To find out more, just write to Atlas. We'll be glad to send samples, technical data and recommendations for application, or to arrange a consultation. Our laboratory staff can assist you in getting maximum benefit from SORBO by applying the lessons we've learned in nearly 20 years of experience with this versatile polyol.

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Soil on collars and cuffs is often stubborn, won't come clean when clothes are washed in the family laundry. And it's a nuisance for the housewife to rub these hard-to-clean spots with bar soap or laundry detergent.

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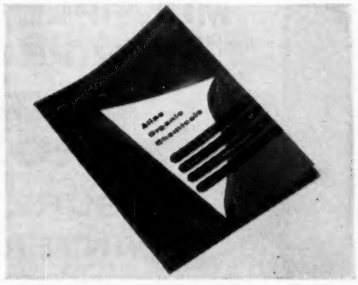

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prices the metal commanded in '55 and '56, stimulated production to near-record rates. By late '56, output tore far ahead of consumption, resulted in the largest accumulation of producers' surplus stocks in years (*table, p. 138*).

Total supply of refined copper in the U.S. last year came to about 1.45 million tons, and apparent consumption totaled about 1.37 million tons. At year's end, stocks on hand reached more than 78,000 tons, more than twice that of the previous year. Much of the production curtailment of the past several months offsets earlier capacity increases, thus, according to some trade followers, '57 supply of refined copper in the U.S. should tally to slightly above the '56 level. Consumption this year, though, may be less than in '56, push year-end stocks to more than 260,000 tons.

Sluggish demand, inspired in part by consumers staying out of the market in anticipation of further price cuts, plus influx of lower-cost foreign copper, has wrung cries of help from profit-pinched U.S. copper marketers. At the recent American Mining Congress in Salt Lake City, for instance, producers urged that the U.S. raise the import tax on foreign copper to at least 4¢/lb., and the base price at which the duty would take effect to 32¢/lb. (from 24¢/lb.).

Currently, there is no tax on copper imports, but under the law, an import levy of 2¢/lb. becomes effective if the price of the metal in the U.S. drops to 24¢ or lower for any calendar month. U.S. tags seemed headed for the "peril" point last month just before smelters called a halt to the 19-month skid in prices, posted the 26¢/lb. schedule. But the peril point has already been reached and, in fact, has been passed, according to some industry spokesmen. J. B. Pullen, assistant general manager of Phelps Dodge's Arizona mines, noted at the mining congress that the present peril point of 24¢/lb. was established in '51. But, he insists, costs have increased since then by an average of more than 33%. As a result, he says, "if the base price of 24¢/lb. for copper was satisfactory in '51, then today the base price should be raised by that percentage, or about 8¢/lb., making the new base 32¢/lb."

Unless some relief is forthcoming, Pullen indicates, the U.S. industry

How gleaming aluminum buildings rise from red mud

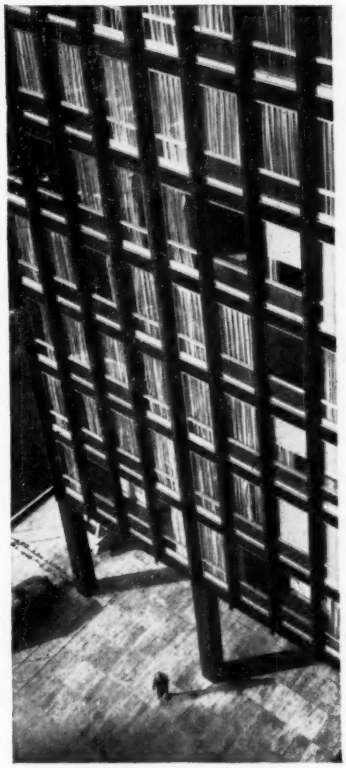
From Babel onward, men have held the vision of ever brighter, ever lighter towers soaring to the sky. Modern metals provided practical substance for the old dreams . . . look around at what's come true so recently.

High on any list of today's versatile, economical building materials you find aluminum and its alloys. Plate, sheet, rolled forms, extruded sections, tubing, wire, rod—forged, stamped, spun—this wondrous metal answers architects' aspirations, fabricators' requirements and users' needs.

With aluminum, as is so often true, the basic raw material is found in nature wildly mixed with other mineral compounds. Bauxite must be carefully purified to provide alumina, the effective starting point for aluminum. Here again, we're happy to report, major producers turn to Columbia-Southern.

Finely ground bauxite is digested with an alkaline solution, under pressure and heat. Treatment with the alkali separates bauxite into sodium aluminate (just several short steps this side of alumina) and a sludge of impurities called "red mud." No other chemical product known effects this necessary and delicate process so well, so economically as soda ash.

Columbia-Southern supplies soda ash to hundreds of producers of non-aluminum goods, too. A personal talk, call or wire can bring tank cars of chlorine, soda ash or other basic alkalies and specialty products to your siding with a speed that will probably amaze your own Traffic Department. Why not contact Columbia-Southern today, while the thought's still fresh?



900 Esplanade Apartments, Chicago—a new concept in multi-story exteriors making extensive use of aluminum supplied by Reynolds Metals Company. Architect: Ludwig Mies van der Rohe

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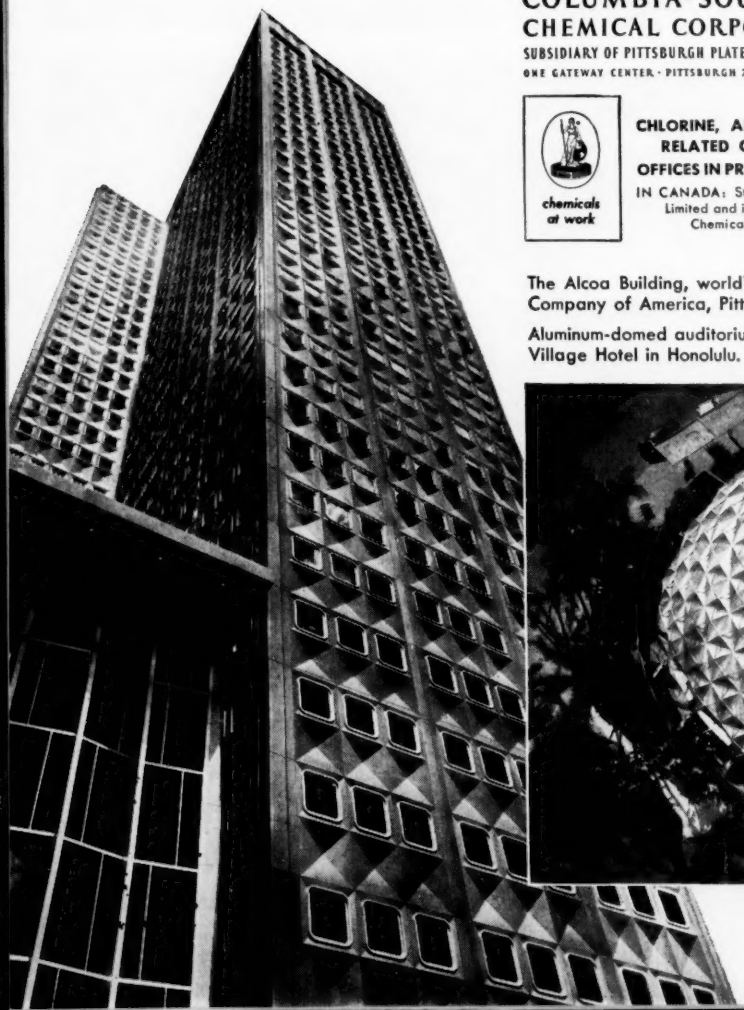

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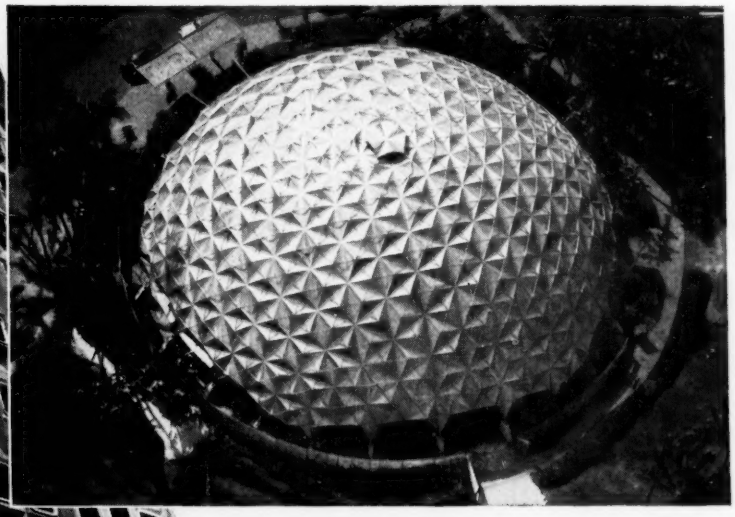

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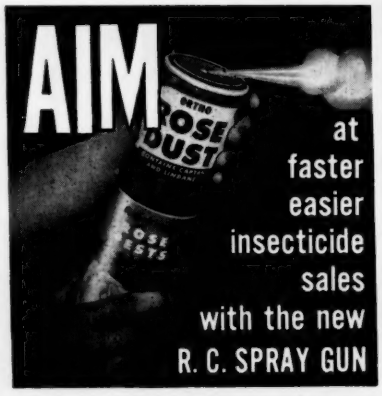

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will continue to be in a spot. Capacity of Western nations has been increased to about 3.5 million tons/year, he says, and projects now in progress and other projects approved will further expand capacity to about 4.15 million tons by 1961. "Thus," he points out, "the industry is faced with a situation whereby the productive capacity is clearly in excess of demand. . . ."

But at the same meeting, the government bluntly put the mining industry on notice to start adjusting its output to "normal demand." "The days of government subsidy programs for the industry, in order to build up mineral stockpiles that may be needed in a national emergency, have about come to an end," said John Liebert, special assistant to the Assistant Secretary for Mineral Resources, Dept. of the Interior.

Liebert, who was representing Sec. Fred Seaton at the meeting, also aimed his advice at foreign suppliers of minerals and metals. They "must also expect to share in the adjustment ahead," he said.

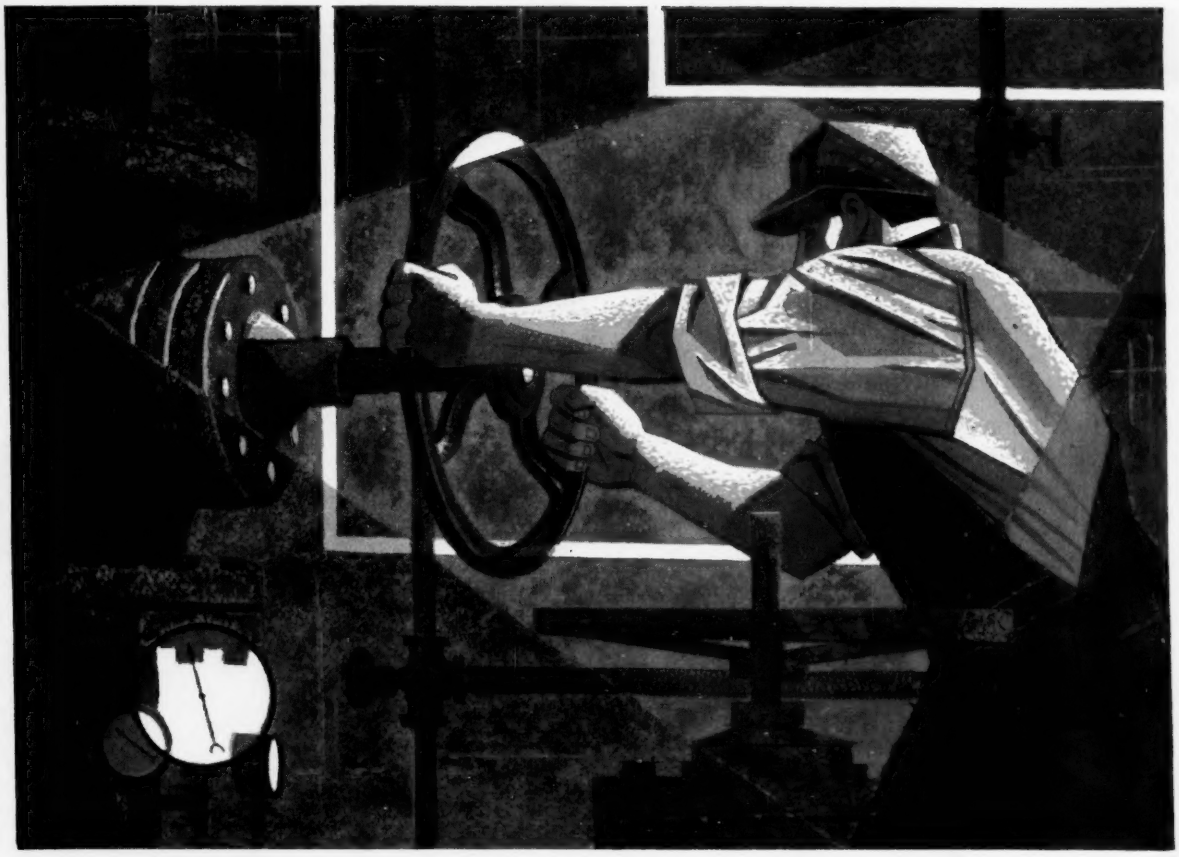
Some observers believe that the present rate of production cutbacks should be accelerated, at least until copper demand catches up. Such action early enough would have relieved domestic producers' carrying unsold stocks that have climbed to nearly 200,000 tons to date.

Actually much of the present softness stems from the low level of activity in a number of copper-consuming industries. Residential housing and industrial construction is down; production and sales of consumer durable goods (including stoves, refrigerators, washers, etc.) have been poor; skidding automobile production and sales have also helped knock copper consumption down from its high position of a year or so ago.

But there may be a ray of hope ahead. In each of these major copper consuming industries—and in the copper chemical business—expectations for '58 and immediately beyond are bright. If the optimists prove to be correct, there could be another copper shortage within the next few years.

Alumina Capacity Climbs

Later this year, U.S. alumina capacity will be jolted upward some 430,000 tons—to a total of nearly 4 million tons/year—when Kaiser Aluminum & Chemical's new $70-million installation at Gramercy, La., begins operations that will supply the firm's new Ravenswood, W. Va., aluminum reduction plant. Here the Gramercy unit (which will also produce the caustic soda needed for its alumina production) is shown receiving an 11,600-tons shipment of bauxite ore from the company's Jamaica mines from Marine Transport Lines' *Marine Merchant*. Kaiser also owns an 800,000-tons/year alumina plant at Baton Rouge.



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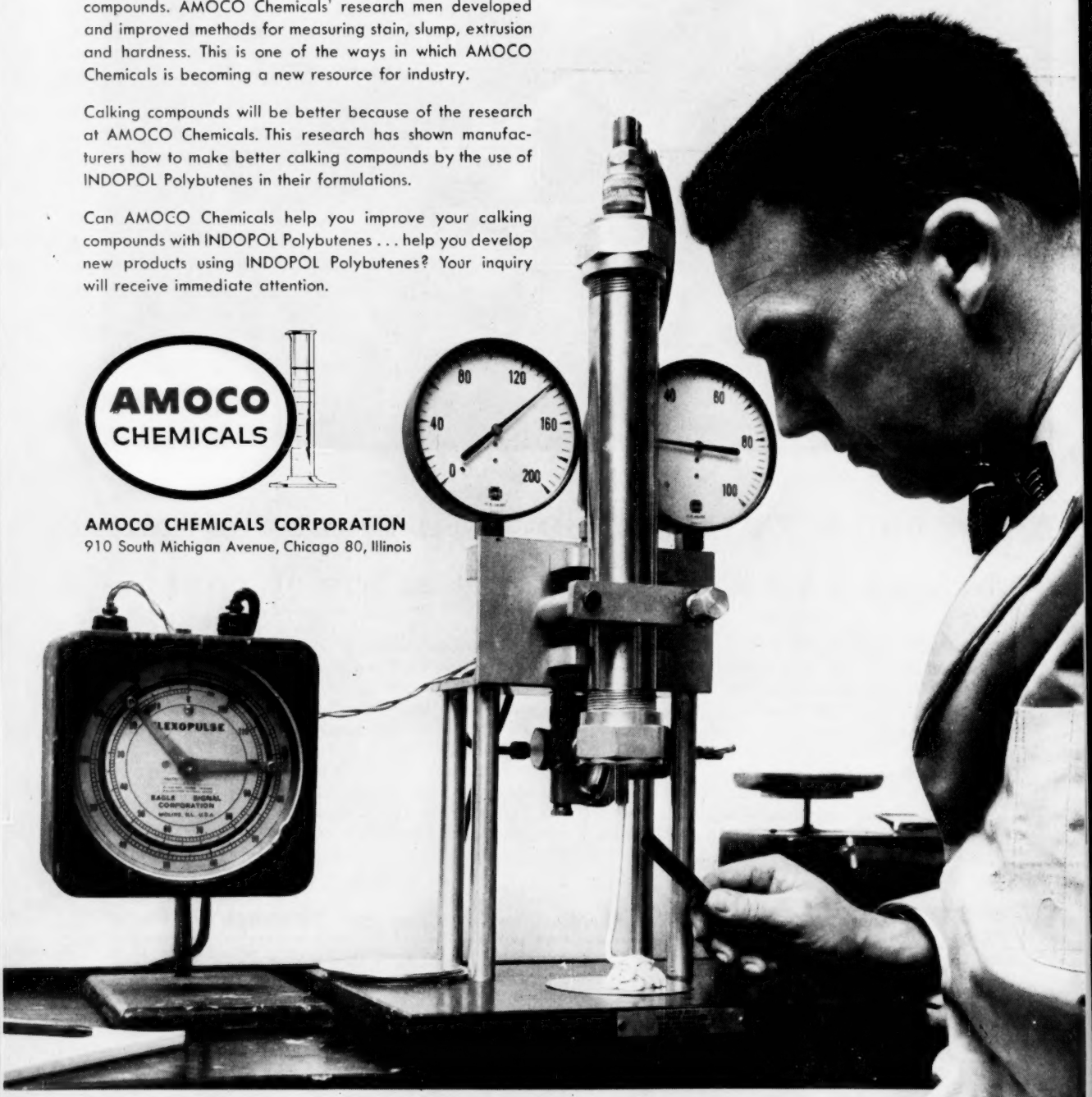

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Market Newsletter

CHEMICAL WEEK
October 12, 1957

The word on Mexican sulfur prices is out this week—and U.S. producers who tossed the industry into an uproar a couple of weeks ago by slashing schedules $3/ton (*CW Market Newsletter, Sept. 28*) don't find it cheering. The Mexican sellers, as they indicated to *CW*, are carrying out avowals to cut prices. Differentials established between U.S. and Mexican tags, however, will be somewhat less than those in effect before the surprise U.S. move. (Some customers of Mexican companies, protected by contract, get back the old spread.)

Texas Gulf initiated the earlier price-chopping because of "general competitive conditions," but the latest development—which brings Mexican export prices down to $23 and $22/ton on filtered and dark material, respectively—kicks the whole unsettled market back to about its previous condition.

Sharpened, too, is speculation that a "price war" is now imminent. Chances are, though, that a slug-fest between U.S. and Mexican sellers will not happen. The reasons are economically elementary: the reductions already posted will cut a wide swath through company earnings; it's a cinch that further declines in domestic or export prices won't pep up sales significantly.

But here's the sulfur topper: some trade talk making the rounds has it that next Jan. 1, a major U.S. producer may jack up sulfur prices to the precut levels.

What about sulfuric acid prices? No changes have been announced, but you can bet sulfuric sellers have been wrestling with a tough problem. Usually a $3/ton sulfur price reduction would have almost automatically spelled out a $1/ton decline in acid tags. But acid makers figure that mounting costs of manufacture (labor and transportation hikes) over the past few years will just about wipe out the current saving they'll realize from lower raw-material costs.

There'll be further delays in making any move, but if sulfuric sellers give in to the considerable consumer pressure for a cut, the resulting reduction will be relatively minor.

•

Some caustic soda makers also have their problems—what to do with stocks building up in a few producing areas, particularly on the West Coast. Compounding the situation is this: other sections are having some local shortages, but they are too far from sources for economic shipment of material. Reports are that some producers are whittling the oversupply by reviving an old—and economically painful—caustic industry practice: hauling the material out to sea and dumping it.

Demand for caustic hasn't been too brisk over the past several months. Fact is, some producers are pegging the slackened demand as

the prime reason for declining net earnings since the first of the year.

A change in the situation may be shaping up, however. Caustic business appears to be picking up (especially for textile needs); some electrolytic producers have reportedly slowed down their caustic operations because of a slight dip in chlorine demand.

•

Southern California gas consumers will be paying more for their needs if the Public Utilities Commission okays petitions filed by two gas companies. The amount (approximately $2.15/1,000 cu. ft.) would boost current rates to industrial users about 5%, and to residential consumers about 3%.

Reason for the requested rate increase: the 11% advance in wholesale gas prices that El Paso Natural Gas will post Jan. 1. Some 70% of the supply of the southern California gas companies comes from El Paso. Spokesmen for the latter say that the additional return "would bring no increase in net revenues," but would simply offset their added costs.

•

Domestic sodium nitrate prices are up $1.75/ton, emulating the recent advance in Chilean material. A major importer raised its prices a couple of weeks ago to these new (c.l., f.o.b. port warehouse) levels: $46.25/ton for bulk quantities and $49.75/ton for material in 100-lb. bags.

New domestic prices posted by Nitrogen Division on its Arcadian nitrate of soda are $45.25/ton (bulk), $48.75 for bagged material. Quotes are f.o.b. Hopewell, Va.

Other fertilizer materials on which prices are higher, by $4/ton, this quarter include anhydrous ammonia, raised to $84/ton (refrigeration grade is increased to $86.50/ton); nitrogen solutions, in tanks, freight equalized, upped to $124/ton; aqueous ammonia, to $87/ton.

SELECTED PRICE CHANGES — WEEK ENDING OCTOBER 7, 1957

	Change	New Price
UP		
Anhydrous ammonia, fert., tks., wks., frt. eqld., ton	$ 4.00	$ 84.00
Blanc fixe, bgs., l.c.l., NY whse., ton	10.00	165.00
Chlorine, liq., cyls., c.l., wks., frt. eqld., cwt.	0.75	11.00
Fumaric acid, tech., bgs., dms., c.l., frt. alld., E.	0.0025	0.2725
Maleic anhydride, dms., c.l., dlvd. E.	0.0025	0.2875
Phosphoric acid, tks., t.w., wks., cwt.	0.25	5.60
Sodium nitrate, dom., crude, bulk, c.l., wks., ton	1.75	45.25
Triethylamine, dms., c.l., wks., dlvd. E.	0.01	0.50

All prices per pound unless quantity is stated.

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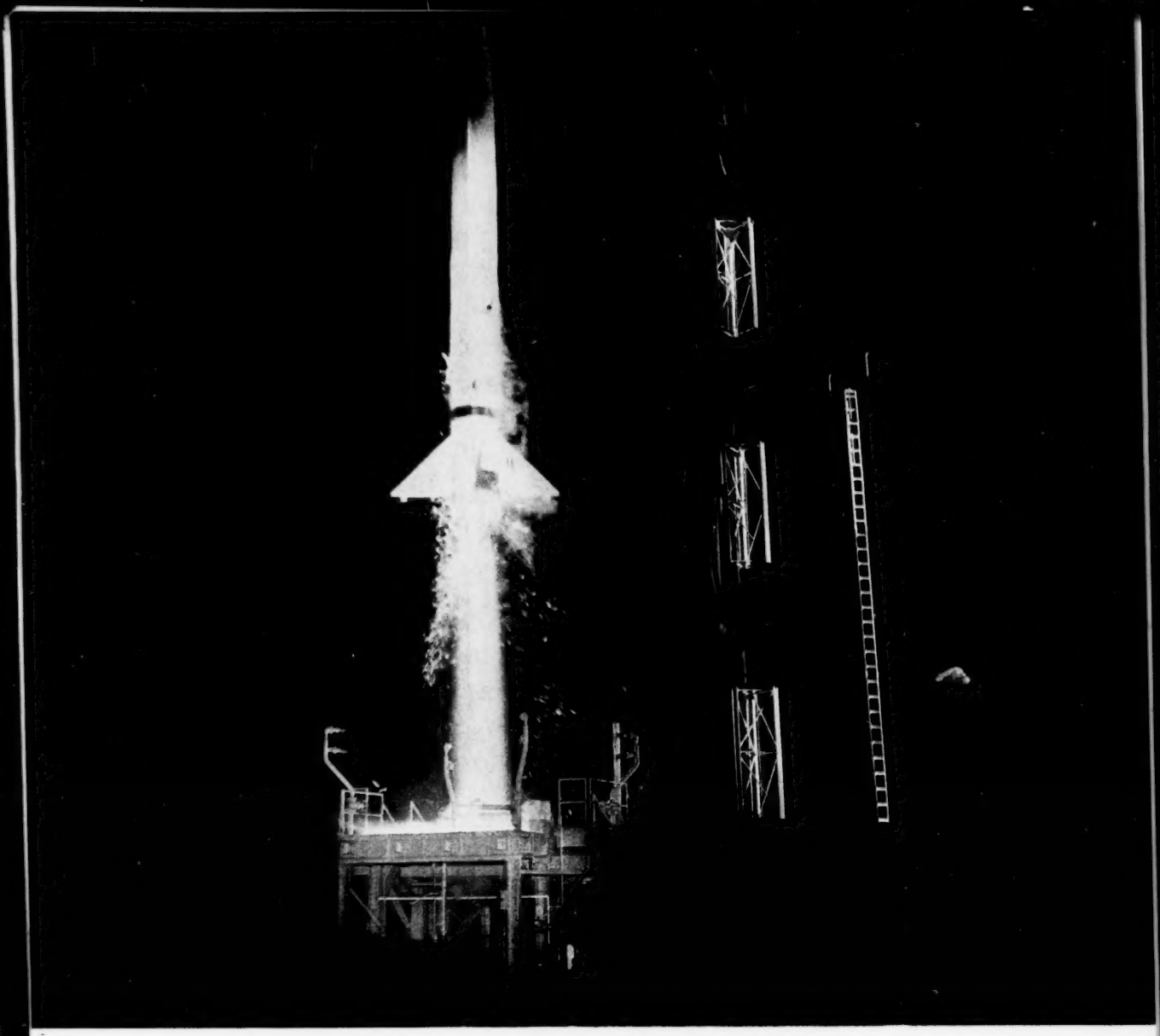


ULTRA ENERGY PROPELLENTS

The step beyond high-energy propulsion

Technology

The step beyond the exciting new high-energy fuels of today are the ultra-energy propellents of tomorrow. They will make rockets fly higher, farther, faster—if they can be harnessed. This "if" involves formidable problems. But whether or not ultraenergy propellents ever become a practical reality, they will have a resounding impact on chemical technology for years to come.

Unquestionably one of the biggest chemical feats of the decade has been the development of the high-energy boron-based fuels. Almost overnight, they have created an industry that will soon have more than $90 million worth of plants in place.

Yet, even before these plants are completed, a dedicated group of engineers are doing their best to make the high-energy fuels obsolete. They're a group of young Turks who refuse to be stopped by the thermodynamic barriers that limit the energy available from common chemical reactions—i.e., those that tap only the energy in the atom's outer electron orbit. Instead, they're digging deeper, trying to get propellent force from fusion and fission of the atom's nucleus and from little-used reactions involving electron orbits—i.e., free radicals, metastable compounds, ions and photons. These are the ultraenergy propellent systems.

There are older (and possibly wiser) heads who caution that none of the new schemes has been proved feasible, let alone economic. In fact, a considerable body of expert opinion puts down all ultraenergy proposals as strictly visionary.

The Chemical Stake: But no matter who's right, the chemical industry can't lose. Right now, of course, chemical companies are playing a key role in the development of the latest propellent systems. And all the ultraenergy ideas involve chemicals. Adapting these ultraenergy fuels to propellent systems will be a problem that chemical technology will, in no small measure, be responsible for solving.

If, for example, free radicals prove to be practical propellent-energy sources, the chemical industry will have to supply the compounds from which the free radicals are made. And generation, stabilization and shipping of them would be a chemical-processing challenge.

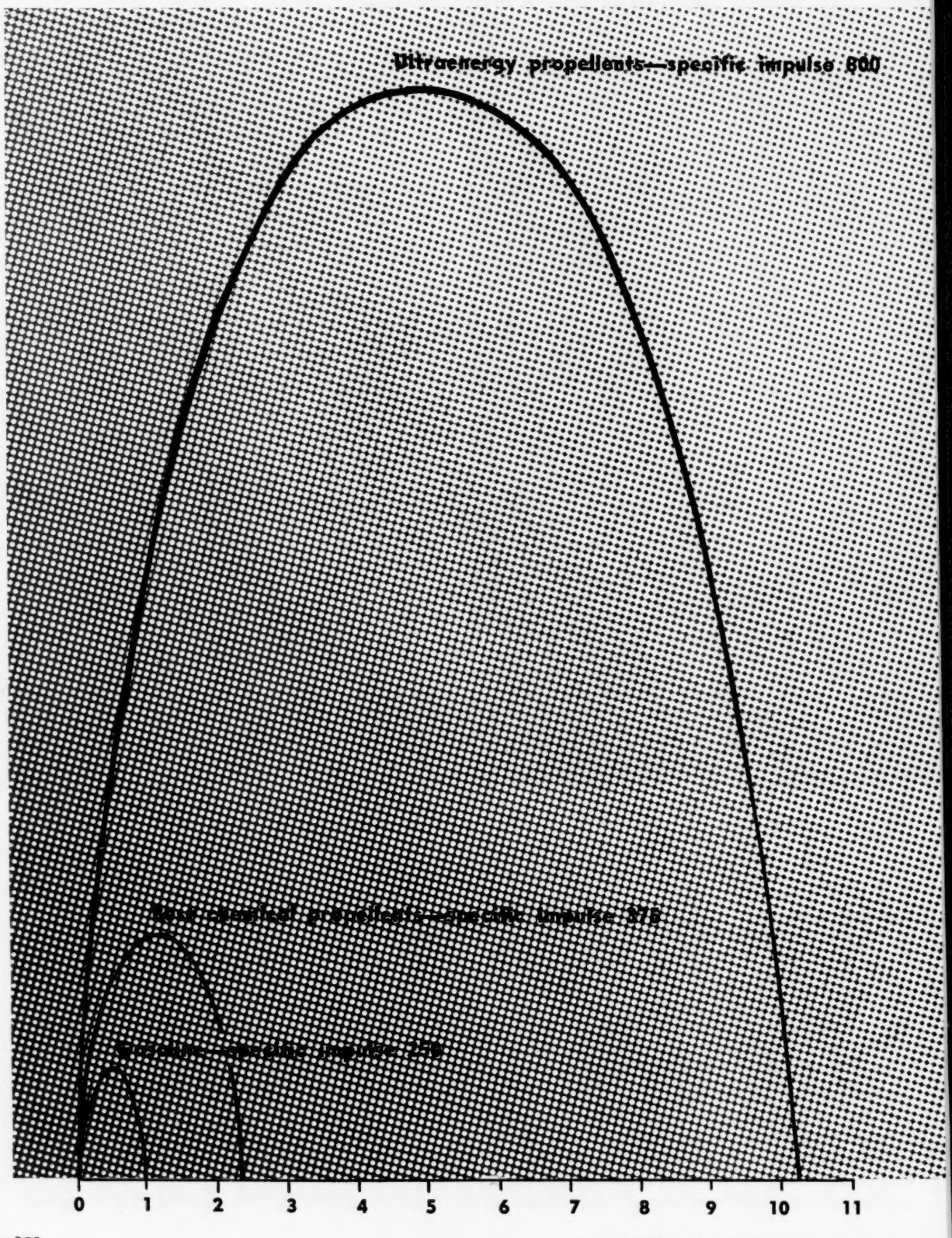
It isn't possible to gauge the potential of the field. But it could easily develop into an industry measured in billions of dollars.

If, on the other hand, none of the ultraenergy systems proves out, the chemical industry will still have collected some invaluable know-how.

Free radicals, for example, are the key to a whole raft of chemical processes (e.g., many polymerizations). The better basic understanding of free radicals that will be gained from the present work could foreshadow their use as a means of completely controlling chemical reactions—a long-standing research goal. Or they might be used to make compounds that can't be made commercially now.

Says George Pimentel, of the University of California's chemistry dept., "It may well turn out that the biggest benefits that will come out of current free-radicals investigations aimed toward new propellents will be the greatly increased fundamental knowledge of the nature and behavior of free radicals.

Increased range—reason for ultraenergy fuel research



What we're doing is studying—at low temperatures, where we can control them—species extremely important to high-temperature combustion reactions. This promises to be more important to studies of high-temperature processes than to propulsion."

One high Defense Dept. official freely admits that his chiefs regarded the ramifications for chemical processing to be one of the main selling points of free-radicals research. And the three-year Defense-sponsored project at National Bureau of Standards, under Herbert Broida, has already uncovered one possible commercial reaction for free radicals: a new ozone process (*CW, March 2, p. 46*).

The chemical industry, of course, has already started to show interest in the commercial aspects of free radicals. At National Bureau of Standards' free-radicals symposium late last month (chairman was NBS researcher Arnold Bass), 420 registered and, according to bureau officials, at least that many more had to be turned away. A surprisingly large number of research directors showed up. Only a few of the latter were actively engaged in free-radicals work. The rest presumably came to determine the possibilities of free-radicals research for their own companies.

The Need for More Power: The military's need for a more potent propellent—to power an intercontinental missile, for example, or to fly long distances without refueling—is fairly obvious. Space travel, even shorn of its military aspects, depends on powerful fuels. Even commercial flying could benefit in the form of increased payloads or longer range.

To understand why it's necessary to turn to free radicals or nuclear propulsion, it's necessary to look at what the rocket engineer calls the "specific impulse." There are other things that must be taken into account in assessing a fuel: bulk or volume impulse, melting point, boiling point and other physical characteristics. But to a rocket engineer, the specific impulse of a fuel is as important as a baseball pitcher's earned-run average is to the team manager. It isn't the only criterion, but the others don't mean much without it.

What's Impulse? Specific impulse is the pounds-force of thrust developed per mass of propellent exhausted per second. It is a measure of the total heat content of the propellent gases before and after expansion.

The velocity, height and acceleration that a rocket will attain at cutoff (when it runs out of fuel) are related to the specific impulse. Velocity varies directly; the other two vary with the square. Thus, doubling the specific impulse of a fuel system would double the velocity at cutoff. But it would quadruple the height and acceleration.

For any propellent system, specific impulse can be determined by a rather formidable mathematical formula. Essentially, however, what this equation says is that the specific impulse is a function of the temperature in the combustion chamber (in degrees Kelvin) divided by the molecular weight of the product gases.

Limitations on Chemicals: There are some practical limitations on temperatures (about 3000 K) that can be held in the chamber. So the idea is to get a lot of energy from a small amount of propellent, which, upon combustion, will give a product that has a low molecular weight.

It can be shown rigorously* that a system of hydrogen and fluorine, which combine to give hydrogen fluoride (molecular weight: 8.9), yields about the best that can be attained from the conventional breaking of a valence bond. With a chamber pressure of 500 psia. exhausted to 1 atm. and a chamber temperature of 3000 K, this could give a specific impulse of 373 (seconds-lb.-seconds/lb.).

For a frame of reference, take a fuel system using gasoline oxidized by hydrogen peroxide. Under the above conditions, it would produce a specific impulse of 248. Pentaborane at the same temperature but under 20 atmospheres when oxidized with peroxide gives a specific impulse of 363.

Rocket engineers are seeking a specific impulse higher than 400. And that's why they're turning to ultraenergy systems.

Challenge of Fission and Fusion

By tapping the nucleus of the atom, the rocket engineer can get just about all the impulse he can use. There are several ways this could be done. A pile with heat exchangers could be used to heat a gas (termed the working fluid). Burning hydrogen in that manner would produce a specific impulse of 890 (at 3000 K and a pressure drop of 300). Heating helium in the same way would produce a specific impulse of 534.

Direct use of fission energy is still another possibility. Gaseous products of the fission reaction would simply be exhausted to give the vehicle its push. Velocities of such products would be extremely high—about one-twentieth the speed of light.

Or, nuclear energy could be used in conjunction with other ultraenergy systems. It could be used to generate ions or free radicals. This might be particularly attractive should it prove possible to generate electricity (for ion and free-radicals production) directly from nuclear energy (without converting into heat).

But the ideal propellent system from many standpoints would be based on fusion. Recent work at the University of California has shown that hydrogen-fusion

*As John Tormey, chief of research for Rocketdyne Division of North American Aviation, did in his talk, "Liquid Propellents—Is There an Energy Limit?", at the New York meeting of the Institute of Aeronautical Sciences last January and at the French Lick meeting of the Commercial Chemical Development Assn. last May (*CW, May 25, p. 23*).

HEAT CONTENT AND SPECIFIC IMPULSE*

System	Heat Released kcal./gm.	I_{sp} (50% energy conversion) lb.-sec./lb.
CHEMICALS (3000 K)		
H_2	11.50	707
He	3.718	401
H_2O	1.785	278
HF	1.140	222
CO_2	0.889	197
CO	0.872	195
N_2	0.866	194
BF_3	0.773	170
FREE RADICALS**		
1.6 H_2 + H	12.3	740
5.0 H_2 + CH†	6.2	492†
4.0 H_2 + N	5.1	472
2.2 H_2 + BH†	4.5	420†
2.8 H_2 + NH	3.8	410

*Dissociation effects neglected.

**With sufficient H_2 to lower the reaction temperature to 3000 K.

†Solid products; 45% energy conversion assumed.

SOURCE: AEROJET-GENERAL.

reaction sequences may be initiated by high-flux-density irradiation with "mu-mesons." This is what Donald E. Carr, assistant research director, Phillips Petroleum, likes to call "the most exciting ultimate propulsive method of all." He points out that the material requirements involve the practically limitless supplies of heavy water in the oceans. At the same time, he cautions: "Technically, there is only the slenderest of practical possibilities, because nobody knows how to create a large-scale flux of mu-mesons."

As a matter of fact, there are some staggering problems to be solved before either fission or fusion can be tied into a propellent system. Shielding requirements are formidable—although Carr feels that "curiously enough, the weight and size handicaps seem less serious for civilian uses than they are for the military."

Then, too, the heat requirements for a nuclear rocket-fuel system would be a lot smaller than they would be for a power plant. That means the fissionable material would have to have a low critical mass.

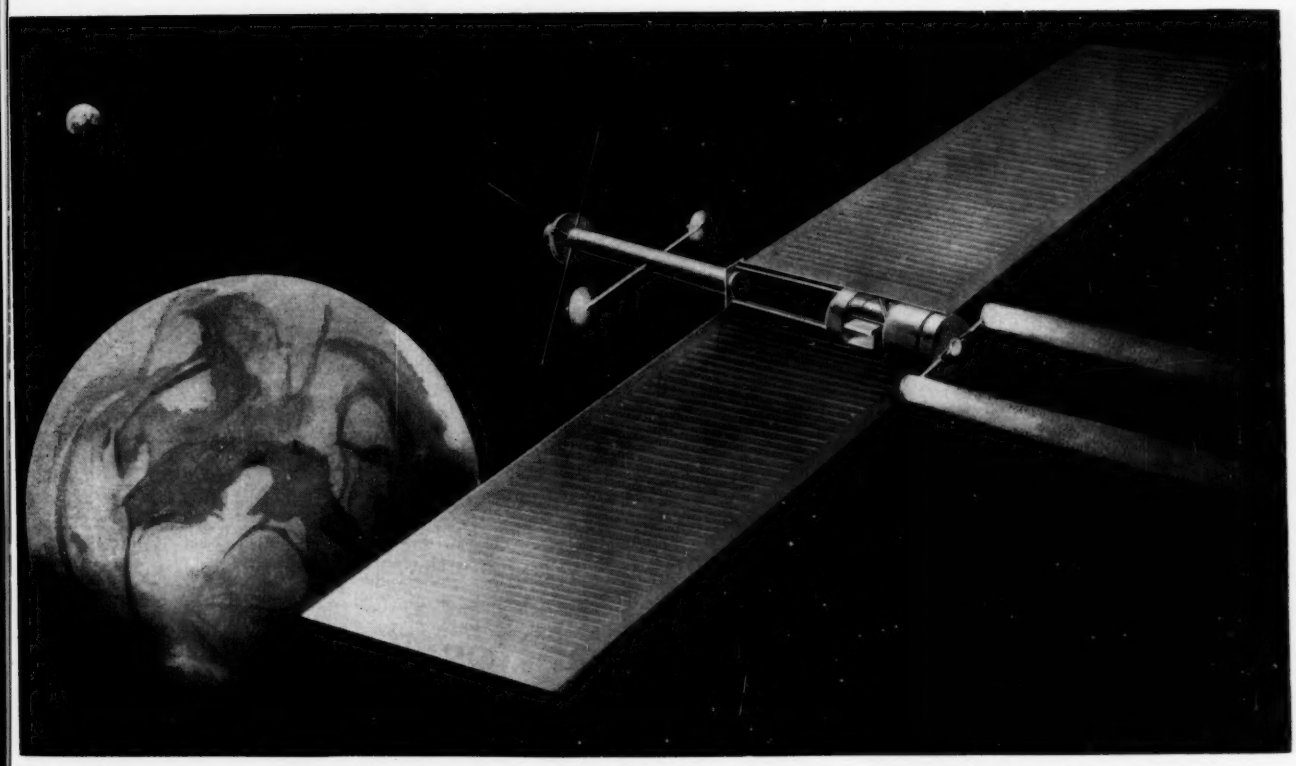
All things considered—the dangers of radioactivity, the hazard of the exhaust, the complex chemical, mechanical and aeronautical-engineering problems—a practical fuel system based on nuclear energy is, at best, a possibility for the distant future.

Free-Radicals Prospects

But while these problems are being solved, there are other ultraenergy possibilities that seem capable of development in a more reasonable period of time. Says Morton Alperin (director of advanced studies, Air Force Office of Scientific Research), certainly one of the most ardent as well as earliest supporters of ultra-energy research (*see box*): "The use of free radicals could provide energy over and above that which can be obtained through conventional chemical propellents. The specific impulse would be far less than that expected from nuclear energy; but even small increases over the specific impulses expected from chemicals now in development would give large increases in velocity and range."

No Charge at All: Free radicals are molecular fragments, such as methyl (CH_3), methynyl (CH), imine (NH). They're formed when enough energy is put into a molecule to rupture one of its bonds. They therefore contain the internal energy of the original molecule, plus the energy required to rupture the bond. This extra energy is released when the radicals recombine to form the original molecule. Thus, dissociation of ethane into two methyl radicals takes about 80 kcal./mole. This same amount of energy is released when two methyl radicals team up to form ethane.

At high temperatures, the two methyl radicals would collide with force sufficient to split each other into



The Snooper is one conception of an ion-propelled rocket. It could attain 40,000 miles/hour velocity.

carbon and hydrogen. Under those conditions, only 64 kcal./mole would be released. Since free-radical propellent systems would operate at high temperatures, it's the dissociation reaction that's important. It's a sort of free-radical fission—rather than free-radical fusion.

In a sense, then, free radicals are merely high-capacity storage batteries. Energy could be pumped into them on the ground, where many of the limitations of an airborne system don't exist. Then they could be recombined in the rocket to give off energy that would be used to heat a working gas. In that way, it's possible to produce some eye-opening specific impulses.

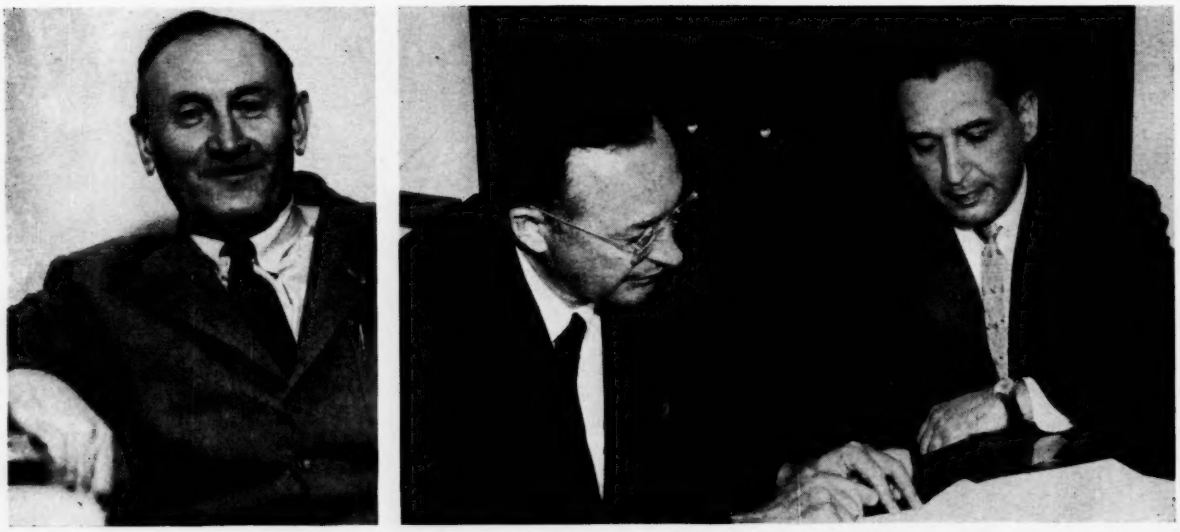
The trouble is that, so far, nobody has worked up a practical system for generating free radicals in anything approaching the concentrations that would be needed. Moreover, free radicals normally have only a fleeting existence. Capturing and freezing them is a problem that hasn't been completely solved.

And although they can produce three or four times the energy of any normal molecular compound, they are subject to the same restrictions on molecular weights as are other propellents. The average molecular weight of the products should be less than 13 to get specific impulses higher than 400. This immediately rules out any combination of free radicals and carrier that contains substantial carbon, nitrogen, oxygen and higher-molecular-weight atoms. In fact, free radicals that would give superior performances, particularly when there is an upper temperature limit such as 3000 K, probably number less than a dozen.

Who's Doing It: Possibly no other area of chemistry is being as intensely subjected to research. The National Bureau of Standards' research program includes contracts on almost every conceivable phase of free-radicals generation, identification and storage. And some gigantic research strides have already been taken by academic researchers (e.g., at Catholic University and Johns Hopkins). But as far as ultraenergy applications work is concerned, some of the most significant work is being done in industrial labs like those of Aerojet-General and Phillips Petroleum, under Air Force contract.

Aerojet-General reports it is investigating all potential free-radicals systems, but it is concentrating its early efforts on mixtures of free radicals and undecomposed molecules obtained from ammonia or hydrogen peroxide. Theoretically, it's possible to obtain specific impulses ranging from 410 to 740 from such systems. This includes allowance for hydrogen, which would have to be added as working fluid.

Says Don Armstrong, director of the firm's Chemical Division: "The imine radical (NH) holds considerable promise, too, as a potential ultrapropellent system." Irradiation of ammonia at 77 K by gamma rays, he



Cal Tech's Zwicky (left), OSR's Alperin and Aerojet-General's Armstrong (right) . . .

First of the New Breed of Research Men

Fritz Zwicky is generally regarded as the father of ultraenergy propulsion. But Morton Alperin and Donald Armstrong certainly must qualify as godfathers or honorary uncles. Back in 1950, Zwicky, a professor of astrophysics at California Institute of Technology, pointed to "frozen-in" phosphorescence and latent photographic images as clues to ultraenergy principles that could be used in the propellent field. He proposed "metachemistry" as a name for the science of ultraenergy propellents.

In '51, Zwicky approached Alperin, of the Office of Scientific Research, with the idea of getting the Air Force interested. Alperin was not only interested; he also was able to procure an appropriation from the Air Force for sponsoring ultraenergy work.

Meanwhile, Zwicky, as chief technical consultant, had found Aerojet-General was willing to do the research. So in mid-'53, Aerojet-General received an Air Force research contract. Under Armstrong, this program is investigating the preparation and stabilization of free radicals with potentials as propellents.

---

points out, could theoretically produce the free radical NH_2, which could persist in the solid state until warmed. Generation takes about 102 kcal./mole. But the concentration obtained to date is so small that removal of the second hydrogen atom does not measurably take place. If, however, the concentration could be stepped up, taking off the second and even the third hydrogens would become increasingly important, since it would take only 97 and 78 kcal., respectively. Further encouragement: NH appears to be formed in minute quantities during the flash photolysis of hydrazine, showing that at least the second atom can be knocked off.

Armstrong and colleagues also plan to investigate a specific system: a slurry of solid ammonia in liquid hydrogen. Several other solids could be used, but, as they see it, ammonia has some clear-cut advantages. It's cheap, and contains nitrogen—which has a high rate of dissociation and a melting point of 195 K—a comfortable 175 degrees above the boiling point of hydrogen.

Calculations based on their earlier work show irradiation of solid ammonia with a 400-curie Co^{60} gamma-ray source would decompose about 10^{-4} moles/hour. They have already put in a 1,000-curie source, and are planning installation of a 1-million-curie source. The same system will be used to study the azomethane-methyl radical system at both liquid-nitrogen and liquid-helium temperatures.

From All Sides: Phillips makes it clear that it, too, is overlooking no bets on free-radicals propulsion.* It is studying the free-radicals potential by high-gamma-flux densities with total dosages of up to 10^9 r. It is also studying methods of concentrating radicals after they are formed, the use of sensitizers to increase efficiency of gamma absorption, rates of recombination and the feasibility of tieing free radicals into a propulsion system.

*Or, for that matter, any phase of propulsion. Phillips has established a Rocket Fuels Division to manage production of Jato rockets and development of advanced missiles; has done considerable work in "fossils" fuel area; has organized an Atomic Energy Division to handle its operations for the Atomic Energy Commission at Idaho Falls. Although the firm has as yet done no work on contract for nuclear propulsion, it has admittedly given "private consideration" to it.

Phillips points out that the ideal free-radicals system would be atomic hydrogen; the ultimate in a free-radicals system would be atomic hydrogen in molecular hydrogen as the working fluid. James Reid, research director, Phillips Petroleum, adds, "Another interesting system would be free radicals, preferably atomic hydrogen, in helium or helium-hydrogen mixtures. It takes less free-radical energy to raise helium to a given temperature. Of course, performance is reduced because of the higher-molecular-weight effect. With no limit on temperature, helium will permit higher performance because of its thermal stability. This stability would perhaps give added advantage to helium in that higher operating temperatures could probably be tolerated."

Phillips researchers have also considered the effects of other possible diluents in some free-radical-working-fluid combinations. Their conclusion: in addition to using hydrogen and helium, thought should be given to stabilizing free radicals in such substances as lithium hydride, hydrazine, or ammonia. Mixtures containing those same substances are worthy of study, too.

Problems Aplenty: Despite the inherent attractiveness of free radicals as a source of propulsion energy, there are a number of obstacles that must be overcome before they can be harnessed. This is how a staff member of the Office of Naval Research sees it: "We're interested in free radicals and other ultraenergy systems. But the first question we must answer is: Will a technology result from the work now going on? If that turns out to be 'yes', we must ask a second question: What will it cost in terms of money and engineering to develop it?"

Reid and the others at Phillips hoist warning flags on four points:

- No one has yet prepared concentrations of free radicals amounting to more than 1%.
- Many problems in refrigeration exist in applying free radicals to propulsion systems.
- No one has demonstrated that highly concentrated free radicals will unite smoothly to permit their use in continuous-flow combustion systems.
- Large concentrations of free radicals may be subject to initiation of recombination by cosmic rays, dust, electrostatic spark, impact, compression or shear.

Aerojet-General sees the same problems. But it is convinced that the problem of stabilizing them is related to the high reactivity of the free radicals rather than to any inherent instability.

Aerojet-General feels that significant stabilization can be obtained in accord with the Arrhenius expression.† Thus, though the activation energy needed to recombine the free radicals may be exceedingly small (usually less than a few kilocalories), it should be possible to drastically lower the rate of recombination by dropping the temperature. For instance, with an initiation energy of 0.1 kcal., the rate of reaction at 77 K could be slashed by 10^5 simply by dropping it to 4 K, the boiling point of helium. And a degree of stabilization has already been attained with some free radicals at 77 K.

Aerojet-General feels that the "cage" theory might apply. According to this theory, if free radicals could be formed with a minimum of kinetic energy, recombination would be greatly inhibited. And it thinks that high-energy radiation should form free radicals with sufficiently large amounts of kinetic energy to benefit from the cage effect. (Others, however, point out that the cage effect doesn't apply to free radicals that occupy adjacent lattice sites.)

Armstrong's conclusion: "The probability of stabilizing significant quantities of free radicals appears small but real. The performance promised by these systems is well worth an extended effort to produce, strengthen, stabilize and use them."

The Promise of Ions

Another possible ultraenergy system is based on ions. The basic idea is to accelerate ions and discharge them into space to provide the push for the rocket. Sodium, rubidium and cesium—all easily ionized—have been proposed as ion sources. Despite their higher cost, rubidium and cesium have an edge because they are heavier, would give the rocket more push.

In a fuels system, the alkali metal would probably be kept molten, pumped into a vaporizing chamber as needed. The vapor would pass through a series of hot platinum or tungsten grids, where it would be oxidized. The ions would then be sent through a magnetic field to give the rocket its thrust.

Goodyear Aircraft's Darrel Romick has described an ion accelerator that would require only 11.6 lbs. of fuel/hour to give a 1,000-ton space craft a rated thrust of 200 lbs. This would be equivalent to an acceleration of 4,540 miles/day, each day.

One of the many problems involved in ion acceleration is that ejection of positive ions would pile up negative ions somewhere in the device in a phenomenon known as "space charge." This would pose no special problems in the atmosphere, where there would be enough negative ions floating around to combine with the positive ions. But, in space, the result would be a wake of positive ions chasing the rocket.

Romick proposes to side-step this by means of a second "gun" that would fire into space the electrons stripped from the ejected positive ions, thereby neutralizing the latter.

The Air Force has let a contract to Rocketdyne to study the feasibility of ion propulsion. (Rocketdyne also has a nuclear propulsion contract and Army and

†$r = Ae^{(-E/RT)}$

Navy ultrapropellent contracts.) In addition, the Air Force has contracted with Avco Research in Boston to develop an ion-generating system. Another Air Force contract has been let to Giannini Research in Pasadena to study ion-propulsion behavior, using a Giannini-developed ion plasma generator capable of cutting a hole through any known material.

Other Ultraenergy Sources

A fourth type of ultraenergy system involves production, stabilization and controlled release of metastable compounds. These are electrically neutral or charged molecules or molecular fragments in an excited state, such as H^*, N_2^*, activated hydrazoic acid, or the metastable form of white phosphorus.

Aerojet-General has demonstrated that hydrazoic acid, when passed through an electric discharge and then condensed at 77 K, becomes activated. It remains in that state until warming supplies sufficient energy to overcome the barrier. When that happens, it gives up the energy difference between its ground and activated states.

In general, techniques of utilizing metastable compounds as energy sources would be the same as those for using free radicals. The problems, however, are a lot bigger.

Photon Propulsion: Photons have also been proposed as a possible basis for a propellent system. Pressure (from a radiating source) would be used to push the vehicle in the opposite direction. The difficulty is that an inordinately large radiating surface might be needed. It has been calculated, for instance, that a surface of 100x370 ft. would be needed to balance a 1-ton rocket against the gravitational pull of the earth. This would seem to limit such a device—if feasible at all—to service in outer space.

Similarly limited would be systems based on solar or electric arc heating. These would work much like nuclear energy or free-radicals systems, except that the heat for the working fluid would be furnished by the sun or by an electric arc. They would give a low thrust per weight of the whole system, and would not be suitable for moving a rocket at any but high altitudes.

There's been some talk about an antigravitational system based on Einstein's unified-field theory work. Such studies, however, are at an early theoretical stage.

The Prospects: An important point to remember is that none of the systems put forth so far are mutually exclusive. And some of the systems would not develop thrusts anywhere near those of chemical propellents. But at very high altitudes, a few ounces of thrust delivered over long periods would be enough to accelerate a heavy vehicle to great speeds. Conceivably, a chemical propellent might be used for the first stage of a rocket, photons or one of the others for the second stage.

The best bet for an ultimate system still seems to be one based on nuclear reactions—ideally fusion. As an interim measure, free radicals seem most likely to succeed, although the feasibility of such a system is anything but a certainty.

Whatever happens, chemicals and chemical technology will continue to bulk big. For the rocket industry is tied to chemicals. And, judging from the commercial potential of this new technology, the chemical industry is tied to a rocket.

Who's Who in the Ultraenergy Research Lineup

A complete list of organizations working on utraenergy propulsion would be nearly impossible to compile. Here are those definitely known to be probing the three major areas of study:

- Free radicals. Aerojet-General and Phillips Petroleum are conducting programs. Most of the other work is being done in universities. About 30 universities are conducting basic studies—15 under Air Force contract; 10 under Office of Naval Research contract; five under Army Ordnance. In addition, Army Ordnance is sponsoring the Bureau of Standards' free-radical research program.
- Ions. Both Rocketdyne and Aerojet are studying ion propulsion. (Rocketdyne has Army and Navy ultraenergy contracts, too.) Avco Research in Boston and Giannini Research (Pasadena) are also working in this area, under the Air Force.
- Nuclear propulsion. Rocketdyne has a nuclear-propulsion contract. Others, like Phillips, are giving it "private consideration." The Atomic Energy Commission has experimental nuclear-propulsion work going on at Los Alamos and the University of California (at Livermore). It also has a unit doing research in nuclear-ultraenergy propellents. Although under an Air Force officer, this is not part of the Air Force program. Wright-Patterson Air Force base in Ohio is also carrying on a nuclear propulsion research program.

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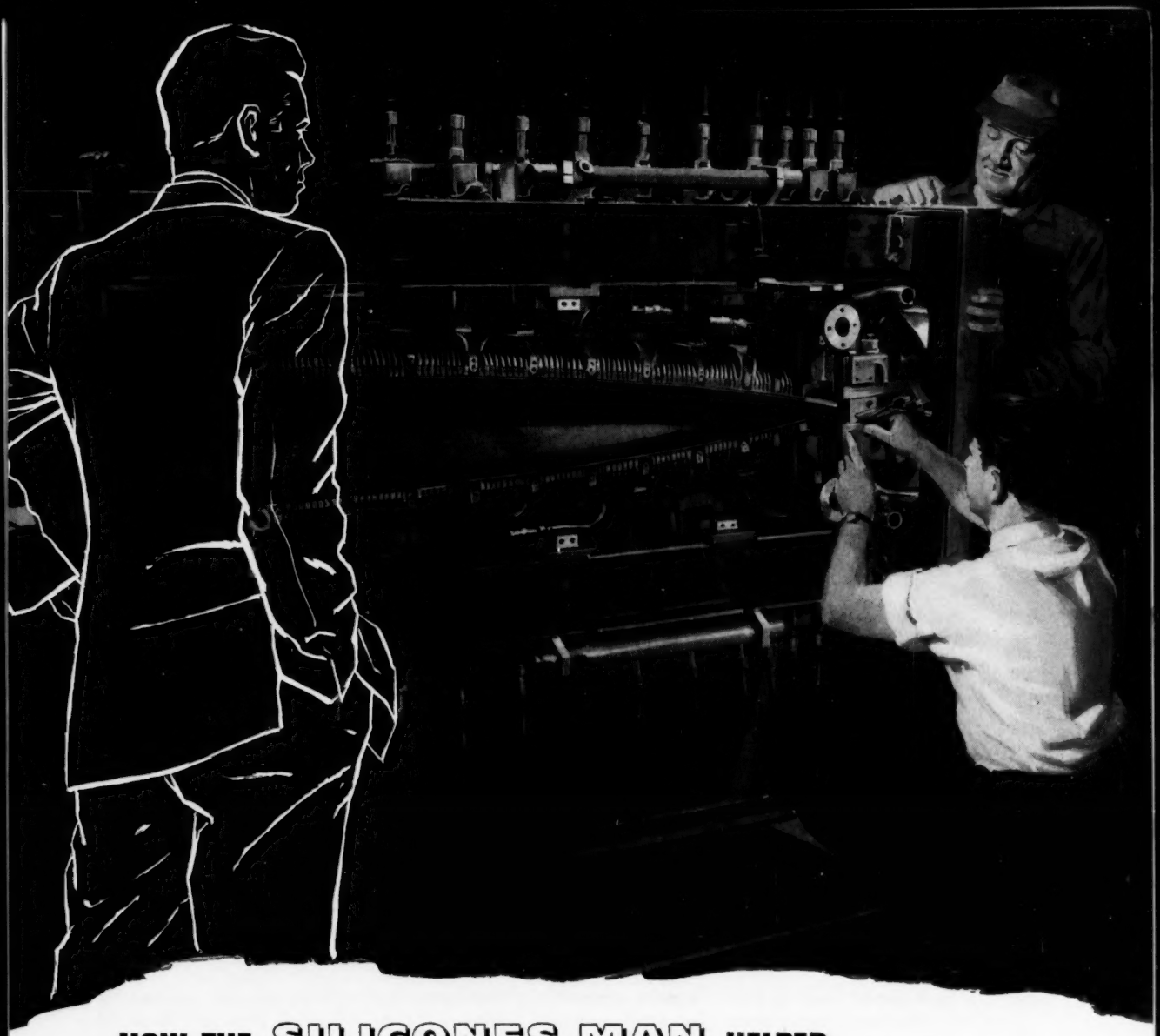

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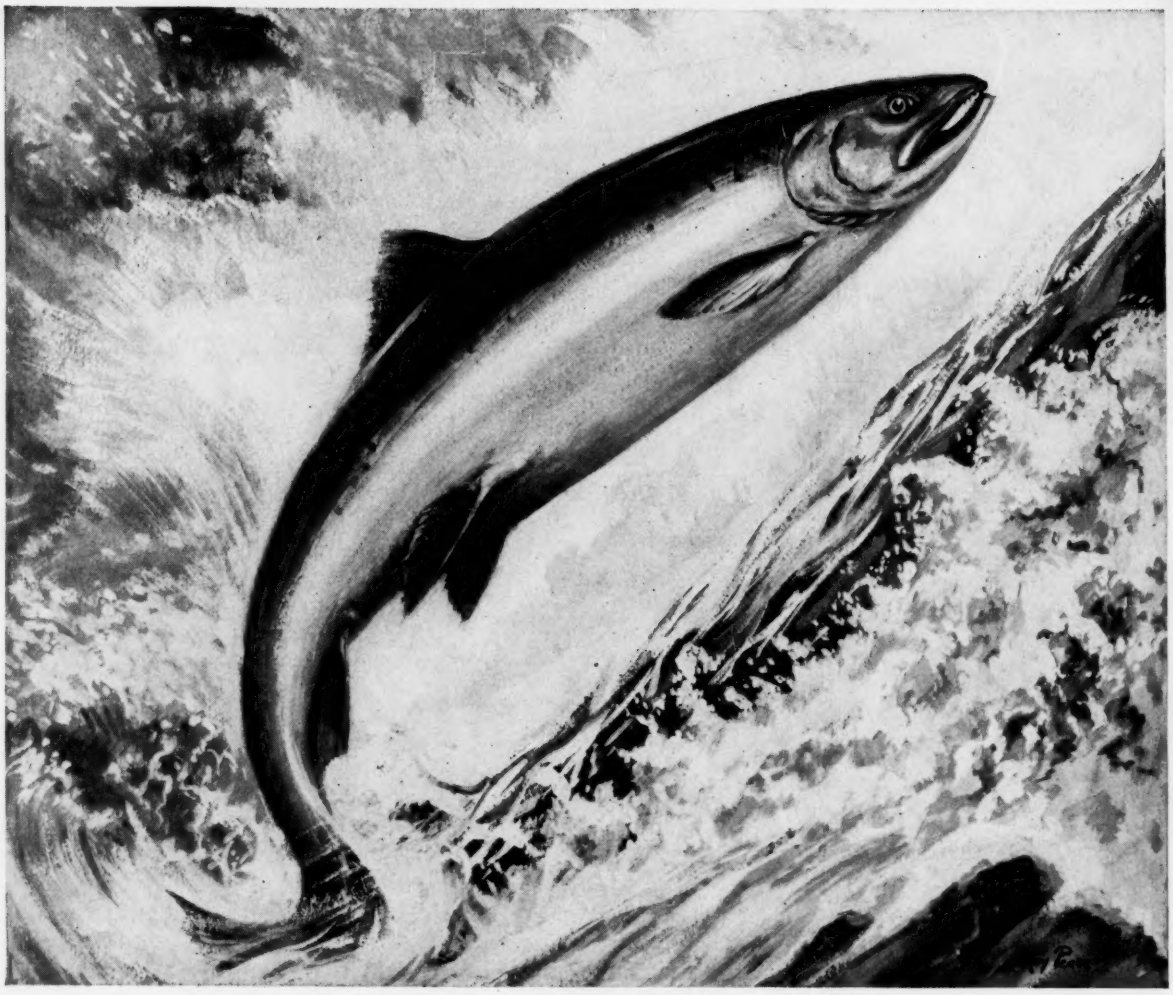

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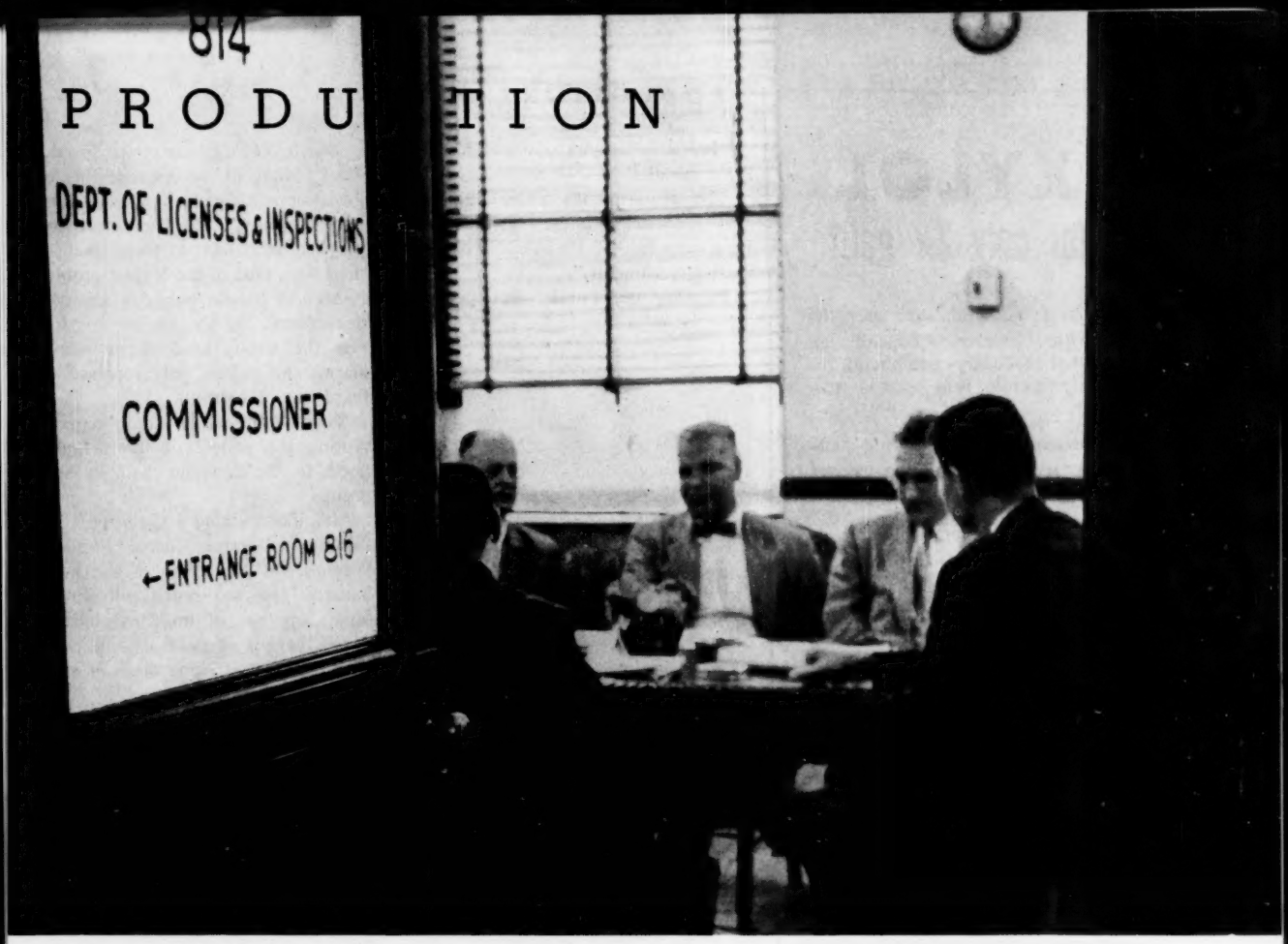

Staffers of Philadelphia's Dept. of Licenses and Inspections have a message for management.

Plant Inspectors Do Some Plain Talking

"Civic inspectors entering a chemical plant to look for fire or other hazards are unreasonable people out to justify their own jobs. They don't know anything about the problems of chemical processing but may leak valuable process secrets to competitors. The best way of handling them is to make them unwelcome, give them as little information as possible." That's a not-uncommon plant-management attitude.

"Not at all," say officials of one city's inspection department. "We're reasonable people, easy to get along with and our goals directly parallel those of the plants we inspect."

This week, Fire Prevention Week, *CW* interviews members of Philadelphia's Department of Licenses and Inspections, gives them a chance to present their side of the story to chemical plant management. Their statements are necessarily confined to the inspection policy of one major city. But their ideas may well be worth heeding the next time you deal with an "outside" inspector.

Intelligent Regulation: "It's our job," says Barnet Lieberman, commissioner of the department, "to regulate intelligently so that chemical operations will be safe for both the city and the industry itself. We can't do it with justice unless we get industry cooperation."

More than that, though, the department likes chemical companies, doesn't want to impose any restrictions that would drive them out. Says Richard Vose, the department's chemical engineer: "We know we're living in a chemical age. And we feel that the chemical industry is one of the most desirable to have around. It has job stability, high pay and employs workers with well-above-average intelligence."

But when it comes to inspecting plants, he makes it clear that he considers it his responsibility to do as thorough a job as he can. "Once I start on a plant," he says, "I don't leave until all the hazards have been noted, even if it means coming back time after time. I convince management that I mean business and the only way to get me out of their hair is to let me finish my job."

He realizes that process secrets are a touchy subject; "Actually, I don't like to pry into secrets any more than plant management likes to have me do it.

"But many processes are common knowledge anyway. If one is really unique, I expect to be taken into confidence, given a complete rundown. When I am, I guard it with my life." He points out that he was in consulting and development work before he took his present job, feels that

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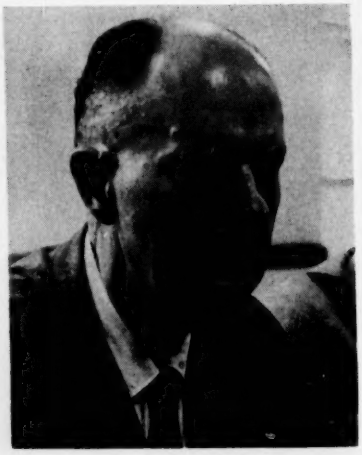
he has a full quota of "ethics and a tight mouth."

The department's chief engineer, Leo Goldstein, adds: "Firms must have some faith in the integrity of their local governments."

Pleasing the Public: But perhaps the most potent argument they can put forth to enlist cooperation from plant management is one based on public relations. They point out that people who don't know are frequently suspicious about what goes on inside a chemical plant. In short, it's not enough merely to have a safe plant, you must let people know that it's safe. And a civic inspector is a logical carrier of this message.



Vose: 'I must know process secrets, but I guard them with my life.'

Outside influences sometimes take a hand. In one plant, Vose was trying to convince the manager that an overaged, leaky ammonia compressor was an explosion hazard as well as an odor nuisance to the neighborhood. While he was talking, a brick was hurled through the plant manager's window. In addition to shattering the window, the brick shattered the manager's belief that he was on good terms with the neighbors. The compressor was replaced.

"Where two years ago we were receiving persistent complaints from neighborhood groups that chemical plants in the area were a menace, today we do not receive one—haven't for the last six or eight months," says Henry Post, the department's fire and housing section chief.

Much of the credit is given to Vose. Many of the hazards the local groups complained about were imaginary, he says. If the plant's activity is properly explained to them, they lose their fear. One of the biggest problems is how to handle publicity about the department. "If the job we are doing gets the wrong kind of publicity it alarms the public, only increases the fear," says Goldstein.

Vose's approach is usually based on visiting the people of the neighborhood in their homes and in small groups.

"It's like walking a tightrope," says Deputy Commissioner Frederick Wegner. "If correction of the actual hazards gets too much publicity, it builds up fear of imagined hazards. But if there is no publicity, the public wonders what is being done, is afraid we aren't on the job."

Why Inspect? The most common plaint met by the department: Is this inspection really necessary? Some of the larger firms point out that their process designs are submitted to their top safety engineers for criticism long before the plant is off the drawing boards. And most firms have their own safety staffs and fire marshals who keep a constant check on safety.

Goldstein: 'Firms must have faith in integrity of local government.'

Vose counters that argument this way: "Firms design their plants for profits. Safety is important to them, but it's secondary. With us, safety is our only concern."

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with this premise. They can point out that safety and efficient operation go hand in hand. And avoiding downtime through safe operation is an unassailable profit motive.

Lieberman does concede that management's point is often valid in this respect. And actually, the department is trying to set up a procedure whereby many plants would carry out most of their own inspections. They hope eventually to work up some sort of a check list that management can use.

"Once firms realize what we are trying to do and are convinced that we know what we are talking about, they are willing to cooperate. It would be a shame not to take advantage of that willingness and the engineering talent they have to do the job," says Wegner.

But Vose is convinced that the fresh approach of an outsider can often prove profitable to the plant. "Sometimes," he says, "the plant engineers are so close to the trees they can only see the bark."

That's why they like to deal directly with the plant manager. They feel that their suggestions are likely to be

Wegner: 'Handling publicity on violations is like walking a tightrope.'

pigeonholed if they aren't made to the top men.

Keep Them Friendly: Quiet, soft-spoken Vose states he tries his best to be tactful and considerate of industry's problems. Says he: "You always run into a certain amount of resistance at first. If initial contact looks as if it's going to end up with a stand-off, I try to keep the atmosphere as friendly as possible. If the situation becomes tense, management can't operate the plant properly. And that's when the situation is ripe for an accident. It's better to bring them around slowly."

At the same time, the department is not unaware of its authority. With

Lieberman: 'Some firms spend sizable sums to go along with us.'

new construction, it can refuse a building permit until a firm complies with its suggestions. If the plant is operating, it can prosecute, close it down. But all members of the department are reluctant to admit they'd ever do that. They prefer to stress the brighter side.

And they're positive that their record so far is an endorsement of their thinking. Says Lieberman: "We haven't had to prosecute a single company. And some companies have had to ante up sizable sums to go along with our suggestions. Two large chemical companies had to spend $650,000."

Most of the problems are with older plants. New ones get checked before they start up. Although changes may be relatively minor—disposing of wastes, installing extra fire escapes, extinguishers and exits—Vose says that some plants are hardly recognizable after needed corrections are made. A few firms have even written the department letters of thanks for the plant improvements. "We like the bouquets, but don't need them," says Post, speaking for

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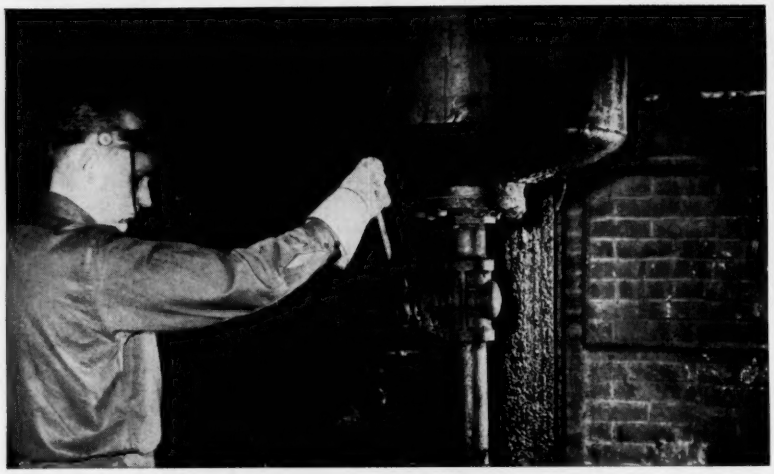

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the department's fire and housing section.

"The problems are a challenge. They offer their own rewards," adds Wegner.

The Weakest Links: Another important consideration to keep in mind when dealing with inspectors is that the regulations are made for all companies in all industries. While chemical plant management can justly pride itself on its safety record, it must, in fairness, be treated the same as that of any other industry.

And no matter how hard it may object to outside inspection, management must—in the final analysis—accept it. Accepting it graciously can pay off in better public relations.

Vose: 'Firms design for profits. Safety is our only concern.'

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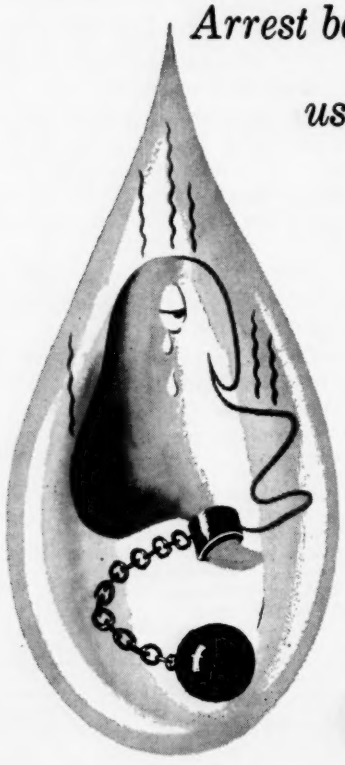

The elimination of unpleasant odor is an important concept of modern merchandising, whether the product is a consumer paint or varnish or an industrial material such as a cutting oil, solvent or fertilizer.

You can assure complete freedom from unpleasant odors by using Sindar's multipurpose masking agents in your product.

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SINDAR® Corporation
Industrial Aromatics and Chemicals
330 West 42nd Street, New York 36, N.Y.

PRODUCTION EQUIPMENT

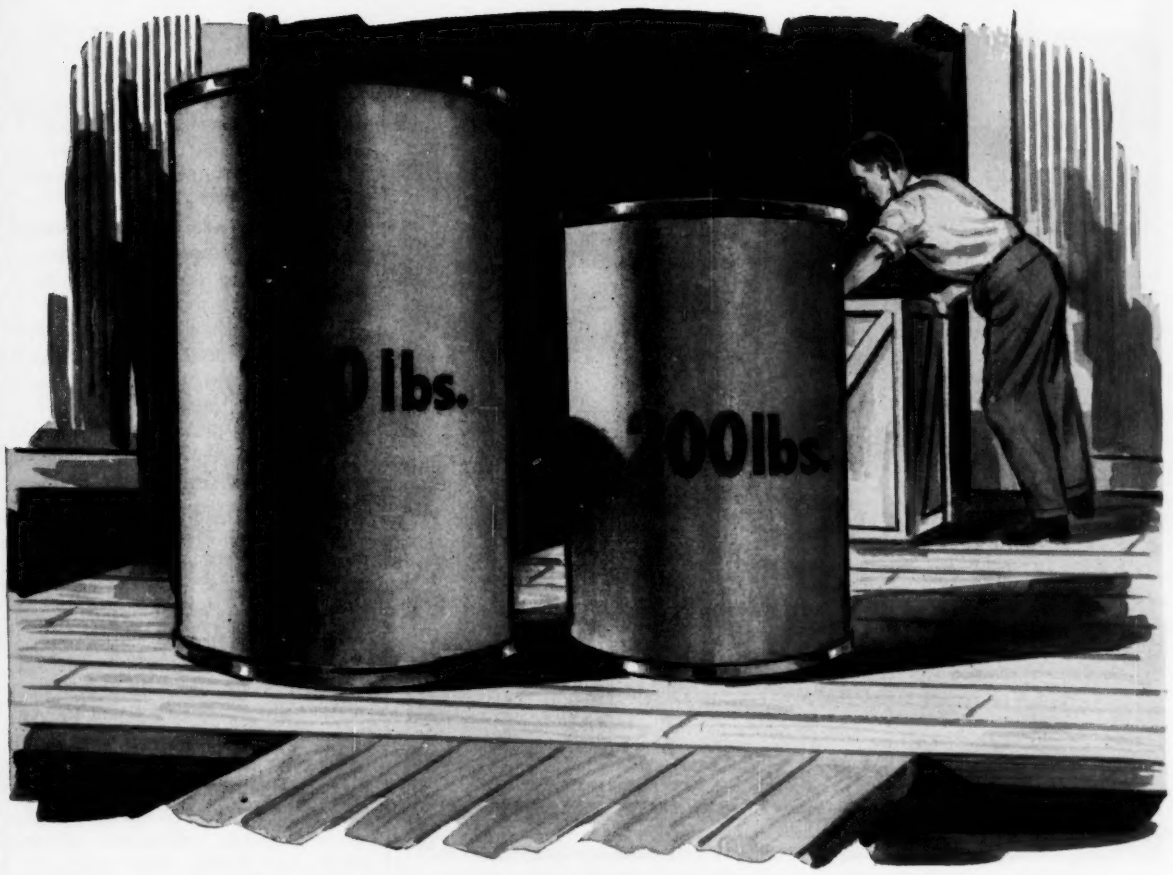
Moisture, Density Gauge: Nuclear-Chicago Corp. (Chicago) recently introduced a new portable gauge for rapidly measuring density and moisture content of many organic and inorganic chemicals by radioactivity scatter count. Called the d/M-Gauge, the instrument operates on the principle that radioactivity is scattered to a different degree by masses of different density or moisture content. A probe —radioactive radium-beryllium source of fast neutrons for moisture, or cesium-137 gamma-ray source for density—is inserted into the material; a scaler is read for a visual scatter count, which is converted directly into moisture content or density by use of a calibration chart. The entire measurement takes two minutes. Accuracy: within 2 lbs./cu.ft. for densities in 50-150-lbs./cu.ft. range; within 0.75% over 0-100% range for moisture content.

•

Dew-Point Monitor: The Aminco Dew-Point Monitoring System, a new offering of American Instrument Co., Inc. (Silver Spring, Md.), records the amount of humidity present in hydrogen coolant for generators. It sounds an alarm when moisture exceeds a preset limit so that corrective measures can be taken to prevent generator breakdown. Sensing stations at strategic points in the gas line continuously draw samples from the line. Samples pass through coils submerged in a constant temperature bath, are checked by humidity-sensing element, then returned to the main line. The system can be adapted to gas-cooled power transformers.

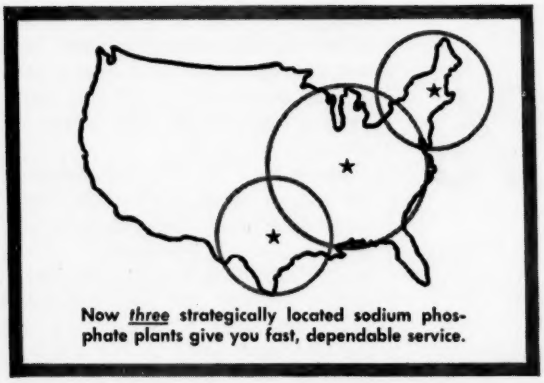
•

Program Controller: Bailey Meter Co.'s (Cleveland) new plug-in program controller, when used with the firm's new receiver-recorder, permits the receiving, recording and programming of process variable within a single recorder case. A 6-in.-diameter aluminum cam that is easily field-cut to the desired shape produces the set-point signal for controlling the process variable. Controller may be set to: (1) repeat full cycle continuously, (2) stop automatically at the end of each cycle, (3) omit or repeat any portion of the cycle. During the cycle, one or two snap switches for external functions may be operated at specific



SHEA SODIUM PHOSPHATES

"fit the formula" for both products!



Now *three* strategically located sodium phosphate plants give you fast, dependable service.

Both of these drums contain the same *weight* of cleaning compound — because some products are light and fluffy — others are dense, concentrated. Not so long ago, the manufacturer of dry-mixed cleaning compounds had no choice when it came to the important sodium phosphates in his formula. All phosphates were made in the conventional, dense form.

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Sodium Hexametaphosphate
Dicalcium Phosphate
Phosphoric Acids, Food and N. F. Grades
Phosphatic Feed Solutions
Organo Phosphorus Compounds
Elemental Phosphorus

SHEA CHEMICAL CORPORATION

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Alamask odor control chemicals reduce the intensity of a wide variety of obnoxious malodors such as these, found in both processing operations and finished products. Rhodia's technical engineers will offer specific recommendations to solve your odor problems. Samples and directions for use are available upon request.

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Immediately available in commercial quantities.

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DOW

points as often as desired. A motor drives the program cam at 1, 4, 6, 8, 12 or 24 hours/rev., operates on 115-v., 25-, 50- or 60-cycle current.

•

Automatic Chemist: The Titromatic Analyser, developed by Electronic Instruments Ltd. and ICI's Billingham Division, is now available in the U.S. from Robertshaw-Fulton Controls Co.'s Instrument Division (Philadelphia) for titration of plant stream samples at regular intervals. A sample is automatically drawn from process stream, fed to a reaction vessel, diluted with water and titrated with standard reagent until completely neutralized. An electric eye determines amount of reagent used; volume is recorded on a chart. The time cycle can be varied from 3- to 30-minute intervals.

•

Steam Valves: Kennedy Valve Mfg. Co. (Elmira, N.Y.) offers a new type of valve disc for rugged steam service. The Kennedized Discs are faced with a tough chromium alloy (hardness: 70 Rockwell C) that will not crack, flake or peel. The new discs are available in bronze-body valves for 125-lb., 200-lb. and 300-lb. steam ratings.

•

Liquid-Level Indicator: Model 300 Echogage is Bogue Electric Mfg. Co.'s (Paterson, N.J.) new low-cost ultrasonic level indicator for measuring levels of liquids that are corrosive, refrigerated, difficult to reach or see. A single indicator can gauge as many as six transducer-equipped tanks (up to 15-ft. high) within a radius of 1,500 ft. The transistorized indicator consumes 5 watts of 120-v. ac. power.

•

Flowmeters: Turbine-type flowmeters with an accuracy of ½% are now available from Commercial Research Div. of George L. Nankervis Co. (Detroit). Called Cox Type 20, the flowmeter produces an electric signal whose frequency is proportional to the rotational speed of the stream-driven turbine, and which is translated to an accurate reading by an appropriate indicator. The flowmeters will accommodate pressures up to 5,000 psi. and temperatures from —80 F to 1000 F. Twelve sizes are available, ranging in capacity from ¼-125 gal./minute.

•

Electric Vibrator: Cleveland Vibrator Co. (Cleveland) has redesigned its

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• Displayed Rate—
$38.00 per inch. Frequency rates on request. Advertising inch measures ⅞ inch vertically on one column. 3 columns to page. Subject to Agency Commission.

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STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF CHEMICAL WEEK published weekly at Philadelphia, Pa. for October 1, 1957.

1. The names and addresses of the publisher, editor, managing editors, and business manager are: Published by McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 36, N.Y.; Editor, Howard C. E. Johnson, 330 West 42nd Street, New York 36, N.Y.; Managing editor, Ralph R. Schultz, 330 West 42nd Street, New York 36, N.Y.; Business manager, Alvin J. Babkow, 330 West 42nd Street, New York 36, N.Y.

2. The owner is McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 36, N.Y. Stockholders holding 1% or more of stock are Donald C. McGraw & Willard T. Chevalier, Trustees under Indenture of Trust m/b James H. McGraw, dated 1/14/21 as modified; Donald C. McGraw & Harold W. McGraw, Trustees under an Indenture of Trust m/b James H. McGraw, dated 7/1/37 as amended; Donald C. McGraw, Individually; Harold W. McGraw, Individually; Elizabeth M. Webster, c/o Donald C. McGraw (all of 330 West 42nd St., New York 36, N.Y.); Mildred W. McGraw, Madison, New Jersey; Grace W. Mehren, 536 Arenas St., La Jolla, Calif.; Genoy & Co., P.O. Box 491, Church St. Station, New York, N.Y.; Touchstone & Co., c/o Wellington Fund, Inc., Claymont, Delaware.

3. The known bondholders, mortagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

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5. The average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: 32,046.

McGRAW-HILL PUBLISHING COMPANY, INC.
By John J. Cooke, Secretary

Sworn to and subscribed before me this 3rd day of September, 1957.
[SEAL]
JANET A. HARTWICK
(My commission expires March 30, 1959)

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For Sale

Unused 5000 gal. Pfaudler Reactor Type 53 glass. Perry, 1415 N. 6th St., Phila. 22, Pa.

Glycerine Evaporators approx. 300 sq. ft. each. Perry, 1415 N. 6th St., Phila. 22, Pa.

Oliver 3' x 6' Rotary Vacuum Filter T316 stainless steel. Late model. Perry, 1415 N. 6th St., Phila., Pa.

100'—9" S. S. Screw Conveyor used—excellent —complete units any length. T. N. 67 Van Reipen Ave., Jersey City.

For Sales—16" Water Strainer "Elliott", Twin, basket type. Good condition. W. L. Broaddus, phone CE 9-7844 P. O. Box 479, Hopewell, Virginia.

Dehydrated Corn Cob Meal: Uniform, Moisture-controlled carrier and diluent. Clean, absorbent, low-cost. Paxton Processing Co., Paxton, Ill.

Business Opportunity

For sale 80 acres or less. R. R. and Utilities. Any type industry Met. N. Y. Write owner, P. O. Box 26, Carlstadt, N. J.

Wanted

Wanted to purchase 55 gallon stainless drums in good condition—used. W-6255, Chemical Week.

Wanted: 15 ton Colton or 20 ton R-I Stokes tablet press, state price and condition. W-6320, Chemical Week.

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P. O. Box 12, NY 36 NY
LOngacre 4-3000

PRODUCTION

RC-50 electric vibrator, made it more compact and powerful. The unit, which formerly supplied a maximum of 1,440 lbs. of impact to the sides of bins and hoppers, can now be regulated to deliver from 750-2,250 lbs. Its weight has been reduced from 99 to 84 lbs. and length from 14¾ to 13⅛ in. The new design also features heavier-duty wiring.

•

Flow-Control Valve: One new pressure-compensated flow-control valve now replaces 12 models in the line of Vickers Inc. (Detroit). Keys: a single-throttle allows sensitive adjustment of flow rate between 5-1,000 cu. in. a minute, and an integral check valve allows free reverse flow up to 1,400 cu. in./minute. Average flow variations caused by temperature changes are reduced to about 25% of those in the valves that are being replaced, the company says.

•

Check Valve: The Williams Gauge Co. (Pittsburgh, Pa.) is offering a new vacuum-controlled check-valve for gas and air reciprocating compressors that are not equipped with automatic unloaders. When the compressor cuts in, the valve disc, attached to the gas-air check valve's piston, rises. Air is expelled from the valve body's cylinder, creating a partial vacuum, holding the valve disc open. Weight of the disc forces it closed when the compressor cuts out. It's aimed for vertical installation only, comes in 1½- to 10-in. sizes for pressures from 125 to 2,500 psi.

•

Saran Lining: Dow Chemical Co. has developed an improved saran lining with a coefficient of thermal expansion that has been reduced 50%. The new gray lining expands and contracts to approximately the same degree as its steel casing, makes operation from minus 0 to 200 F possible. Complete saran-lined piping systems using the new material are available from Saran Lined Pipe Co. (Ferndale, Mich.).

•

PVC Valves: Valves with socket ends have been added to the Lunkenheimer Co.'s (Cincinnati) line of polyvinyl chloride valves. Valves are installed in PVC pipelines by solvent welding with commercially available solvent cements.

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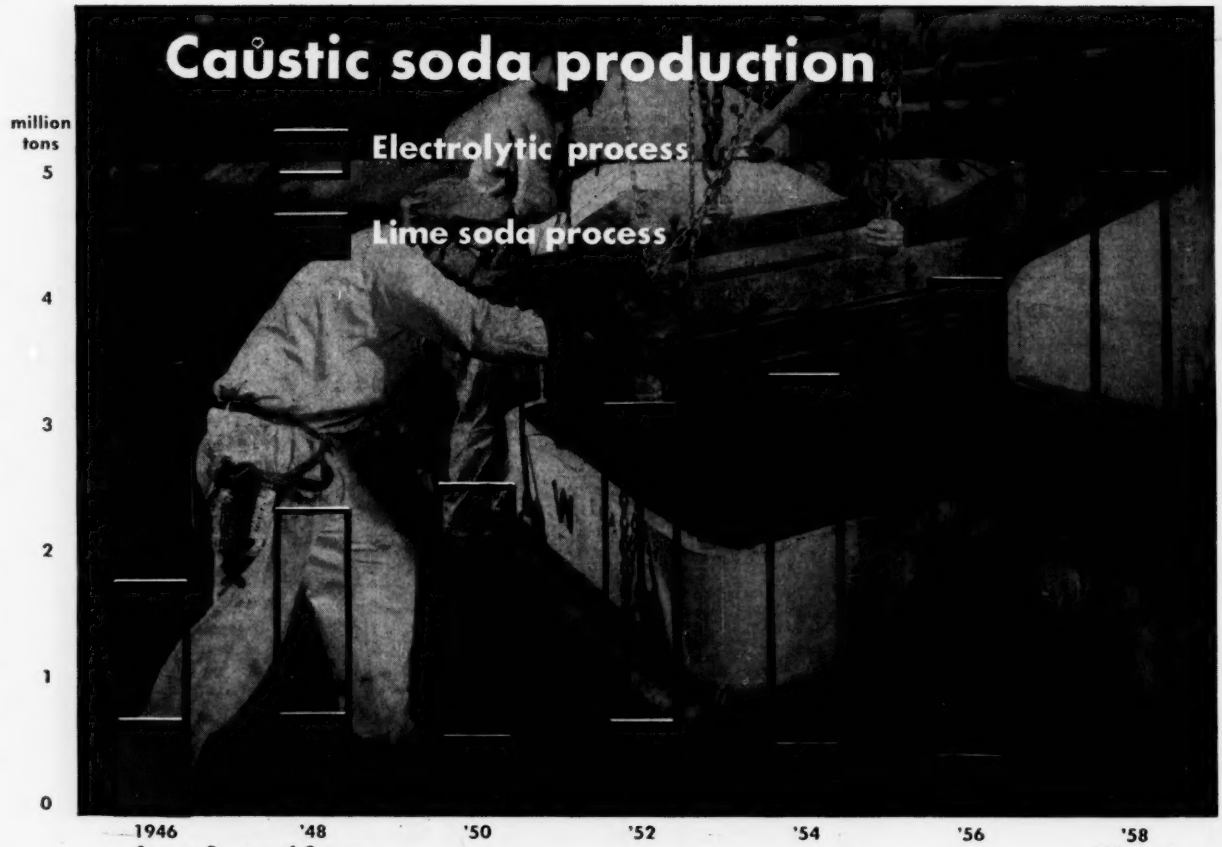

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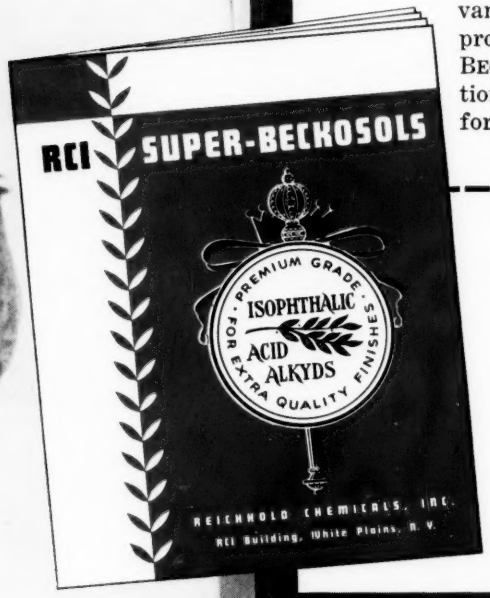

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